

# LEGISLATING ENERGY POVERTY

A Case Study of  
**How California's and New York's  
Climate Change Policies Are  
Increasing Energy Costs and  
Hurting the Economy**

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# Introduction and Executive Summary

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California and New York epitomize the American dream. They are beacons of opportunity where, for generations, people have flocked to build a better life for themselves and their children. Unfortunately, it is becoming harder and harder for far too many families to obtain the American dream in these states due, in part, to over-zealous laws and regulations. Their approach to global climate change policies – the CA-NY approach – exemplifies the problem.

Broadly speaking, the CA-NY approach to global climate change is designed to achieve one of two goals: increase the costs of disfavored energy sources or reduce the costs of favored energy sources. Since the resources to subsidize favored energy sources must come from somewhere, regardless of the goal chosen, these policies impose additional costs on California's and New York's economy.

Raising the cost of any activity decreases its amount – it's basic economic logic. The CA-NY approach to global climate change increases the costs of energy use in these states, which result in higher consumer costs, higher production costs, less energy use, and large economic losses. Despite this clear economic logic, there is a growing belief that global climate change policies will not harm economic growth. In fact, just the opposite, growing numbers of people believe that these policies will actually promote economic growth. Due to the growing concerns surrounding global climate change, this misnomer encourages other states to adopt the CA-NY approach.

This would be a mistake.

Widespread adoption of the CA-NY approach will impose large economic costs on the country while not necessarily leading to larger reductions in greenhouse gas (GHG) emissions. The purpose of this analysis is to present the arguments and evidence demonstrating that the CA-NY approach to global climate change is economically harmful.

The analysis begins by describing the policies that comprise the CA-NY approach and briefly overviewing each policy's expected economic impact (these impacts are evaluated in greater depth later in the analysis).

The second section directly responds to the misnomer that California's and New York's global climate change policies incent economic growth. This misnomer arises because analyses do not evaluate the full economic impact. Take green technology subsidies as the example. Advocates will claim that subsidizing the production of green energy resources encourages the creation of "green jobs", and the creation of these jobs is a net economic benefit.

“ The CA-NY approach to global climate change increases the costs of energy use in these states, which result in higher consumer costs, higher production costs, less energy use, and large economic losses.

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Of course, this claim is correct. When the government subsidizes any industry, such as renewable energy, these subsidies will create jobs in the industries lucky enough to receive the government largess, or in this case green jobs. But, this is only part of the story. A complete analysis recognizes that the tax dollars spent subsidizing a favored industry must come from somewhere. The total green jobs created are, by definition, offset by the lost jobs that could have been created had the resources not been diverted toward the favored industries. The negative impacts from the subsidies must also consider the other adverse economic impacts that include higher energy costs, diminished energy efficiency, and diminished incentives to work, save, and invest that the higher taxes needed to fund these subsidies impose. When the full impacts from the policies are considered, it is clear that the CA-NY climate policies are imposing net economic hardships on Californians and New Yorkers.

Once the growth misnomer has been addressed, the emissions reduction performance of both California and New York relative to the nation overall is discussed. The relative emissions performance of California and New York provides valuable perspective because, even after excluding the reductions in these states, national carbon dioxide emissions are declining, and many of these other states are not implementing the CA-NY approach.

“ Cap-and-trade regulations impose additional costs on the production or use of electricity, and consequently increase electricity prices. The higher energy prices increase businesses costs and the costs of living for families.

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Instead of the CA-NY policy of government created carrots and sticks, other states are allowing market-driven technology changes to drive their emission reductions that include embracing the fracking revolution and subsequent greater reliance on natural gas rather than coal. While many of these states (such as West Virginia and Ohio) started from a relatively more carbon dioxide intensive economy, these states have also seen larger, or at least comparable, percentage reductions in carbon dioxide emissions. Since there are other approaches to reducing carbon dioxide emissions, the CA-NY strategy should not be evaluated as if it is the only way to proceed. It must be evaluated against these alternatives. When evaluated against these alternatives, it is clear that since U.S. CO<sub>2</sub> emissions peaked in 2007, California and New York are not the nation's emission reduction leaders.

State emission trends by themselves tell an incomplete story, however. Relative state emission levels are inseparable from state economic profiles. For example, automobile manufacturing is traditionally concentrated in midwestern states, while finance is traditionally concentrated in New York City and San Francisco. The emissions generated from automobile manufacturing varies tremendously from the emissions generated from financial firms, indicating that the emissions generated in states such as New York and California will differ from those generated in Michigan and Ohio. Further complicating the comparisons, people in Michigan use financial services, and people in California purchase cars. Therefore, the emission profiles of the states will look very different on a consumption basis rather than a production basis, which is how state emissions are typically measured. The next section evaluates these issues.

Accounting for these considerations reveals three important trends. First, the CA-NY approach does not reduce emissions more effectively than other approaches, such as greater use of natural gas in lieu of coal. Second, emissions produced in California and New York should be lower than the U.S. average based on the structure of their economies. Third, the emissions based on consumption patterns also matter, and measuring emissions based on what residents consume reveals that California's and New York's CO<sub>2</sub> emissions are much higher than the current production-based measures indicate. These considerations diminish the relative value created by the CA-NY approach, and argue against other states who are not implementing the CA-NY approach from adopting these policies.

Following this discussion, the final section evaluates the economic costs associated with the array of policies that, taken as a whole, comprise California's and New York's policy approach to global climate change. This section illustrates that this CA-NY approach raises energy costs, imposes costly burdens on lower-income families, and discourages economic activity. These consequences fall into several categories including:

- Higher costs of living caused by higher electricity and gasoline prices. As a result, energy expenditures are \$21.2 billion and \$6.3 billion higher in California and New York, respectively, relative to the average U.S. costs per Btu.
- Less economic activity due to the higher residential, commercial, and industrial electricity costs, which is exemplified by the exodus of businesses out of both states.
- Increased costs on families, which contribute to California's and New York's highest and 7<sup>th</sup> highest poverty rates in the nation, respectively (based on the supplemental poverty rates that adjust for factors such as differences in the cost of living). And,
- Increased cronyism due to the politicization of the economy.

These negative impacts are the inevitable result from the CA-NY approach, and create large economic costs that are a significant threat to people's well-being. Other states considering implementing the CA-NY approach to global climate change policies should take heed of these costs and recognize that following California's and New York's lead also requires that they bear the same burden.

## The CA-NY Approach to Global Warming

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In California, the 2006 Global Warming Solutions Act, aka AB 32, is often positioned as the pivotal GHG emissions reduction legislation. AB 32 authorized California to establish both a cap-and-trade program and emissions target reductions for the state. Reforming the Energy Vision (REV) is New York's current comprehensive roadmap to expand clean energy in the state. REV's goal is to "build an integrated energy network able to harness the combined benefits of the central grid with clean, locally generated power."<sup>1</sup>

Both AB 32 and REV have encouraged the implementation of policies that, taken as a whole, comprise the CA-NY approach to global climate change. This approach implements a litany of taxes, subsidies, and mandates designed to fundamentally redesign the energy infrastructure of both states including: cap-and-

trade regulations, renewable portfolio mandates, net metering, efficiency standards, motor vehicle and renewable fuel standards, electric vehicle subsidies, targeted taxes and subsidies, and restrictions on fossil fuel production.

**Cap-and-Trade:** Cap-and-trade is one of the pivotal policies used by both California and New York to mandate reductions in greenhouse gas (GHG) emissions. The programs require specified GHG emitters to purchase permits (aka “allowances”) in order to engage in activities that emit GHGs. These government-issued allowances will gradually become scarcer, effectively capping each state’s GHG emissions (from those sources) in the future. Permit holders are able to trade these permits with one another (the trade part of “cap-and-trade”), which supposedly ensures that the permits are used by those emitters producing the goods and services that are valued the most.

California’s cap-and-trade regulations went into effect in 2013 (allowance auctions were held in November 2012) and applies to power plants, refineries, and factories, and covers approximately 85 percent of total GHG emissions in California.<sup>2</sup> According to the Center for Climate and Energy Solutions,

the California Air Resources Board (CARB) implements and enforces the program. The cap-and-trade rules first applied to electric power plants and industrial plants that emit 25,000 tons of carbon dioxide equivalent per year or more. Beginning in 2015, the program was extended to fuel distributors meeting the 25,000-metric ton threshold. The program’s overall greenhouse gas emission cap declines by three percent annually from 2015 through 2020, and faster (details still to be determined) from 2021 through 2030.<sup>3</sup>

Unlike California, New York does not implement a state-based cap-and-trade system, but participates in the Regional Greenhouse Gas Initiative (RGGI) along with seven other Northeastern and Mid-Atlantic states (Connecticut, Delaware, Maine, Maryland, Massachusetts, Rhode Island, and Vermont). RGGI specifies a regional cap on CO<sub>2</sub> that applies to emissions from the power sector. This cap becomes more restrictive over time and currently sets a target through 2030. The base cap for 2020, for instance, is 78.2 million tons of CO<sub>2</sub> emissions.

Cap-and-trade regulations impose additional costs on the production or use of electricity, and consequently increase electricity prices. The higher energy prices increase business costs and the costs of living for families. The higher costs also diminish incentives to work and invest in these states.

**Renewable Portfolio Mandates:** Renewable portfolio mandates (or requirements) establish arbitrary goals for the share of energy that must be produced from some (but not all) sources deemed to release zero emissions, generally including sources like wind, solar, and hydropower, but excluding nuclear power. The goals are typically expressed as a percentage of the generation that must be produced by the specified sources.

California has established the most aggressive renewable portfolio goal, which was just recently increased in 2018. The goal for the state is now 100 percent of its electricity should be generated from zero-emission energy sources by 2045. Along the way, California will have to meet a restrictive target of 50 percent zero-emission sources by 2025, and 60 percent zero-emission sources by 2030.<sup>4</sup> Prior to the 2018 legislation that set the 100 percent renewable energy goal by 2045,<sup>5</sup> California imposed a 50 percent mandate goal by 2030.<sup>6</sup>

Not to be outdone, New York’s REV has established a goal that 50 percent of its electricity generation must come from renewable energy sources by 2030 as part of the state’s efforts to reduce GHG emissions to 40

percent below 1990 emission levels by 2030.<sup>7</sup> By 2050, New York's goal is to decrease GHG emissions to 80 percent below 1990 emission levels.

Renewable portfolio requirements force the use of specified energy sources regardless of their price, quality, or economic viability. Similar to cap-and-trade regulations, these mandates increase costs; unlike cap-and-trade regulations, by forcing the use of sources that may be inappropriate for the grid, renewable portfolio requirements can also have destabilizing impacts on the quality of the energy system. These impacts are discussed in greater detail below (in the section titled: *The Economic Costs Imposed by the CA-NY Approach to Climate Policies*). Fortunately, for residents of New York and California, due to their topography, river systems, and federally funded dam projects, they are the 4<sup>th</sup> and 3<sup>rd</sup> largest producers of hydroelectric power, which is not available in the majority of states. Based on the existence of these cheap hydropower resources for such a large percentage of their generation, the prices for electricity in New York and California should be well-below the national average. They are not.

“ Efficiency standards increase the upfront costs for products that will, supposedly, lead to long-term energy savings that exceed these costs.

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**Net Metering:** Net metering is a policy that requires utilities to purchase the excess power generated by households and commercial businesses with rooftop solar panels, typically at retail prices. The utilities must purchase this energy regardless of whether the grid requires the excess energy or not, and regardless of whether there are significantly lower cost options.

The requirement to pay retail prices to purchase the surplus energy creates a profitable subsidy for the households and businesses with rooftop solar panels. All other energy generators (such as a power plant that generates energy from natural gas) do not receive retail prices when they sell energy into the grid. Nor, should they; they receive the wholesale price because these producers have not provided the transmission and distribution services that the retail prices include and often comprise approximately 50 percent of the cost of retail electricity. Since the same economic reality applies to households and commercial businesses that generate excess energy from solar panels installed on their roofs, receiving retail prices for the energy they generate is a large, unwarranted, subsidy.

Beyond providing subsidies to households and commercial businesses with rooftop solar panels, net metering policies deprive utilities of the revenues they require to cover the full costs of operating the grid. Since these costs must be paid, they are typically pushed onto other customers through higher delivered electricity prices. Consequently, net metering policies significantly increases the costs for other ratepayers. The households and commercial businesses that install rooftop solar panels are typically the most affluent and politically-connected ratepayers, indicating that less affluent customers must pay higher electricity prices to subsidize the costs for wealthier customers.

Both California and New York (for farm-based and non-residential customers)<sup>8</sup> impose some type of net metering program forcing utilities operating in these states to overpay for energy that they must purchase whether the energy is needed or not.

**Efficiency Standards and Programs:** Energy efficiency standards mandate that consumers use products that meet the government-desired threshold for energy efficiency. States apply these efficiency standards to a wide range of products that include household appliances and equipment. Both California and New York also impose aggressive building efficiency standards that mandate new homes include energy efficient attributes such as high-performance attics and energy saving windows.

With respect to appliance and equipment efficiency standards, California has been the initiator on standards for more than 50 products, many of which have become the national standard. As of 2018, California has also imposed a solar panel mandate that, beginning in 2020, requires all new homes under three stories tall to contain solar panels (the specific solar mandate will vary depending upon the home’s location and size). New York has appliance and equipment efficiency standards on 19 products, but the national standard has preempted the state standards on 14 of these products.<sup>9</sup>

Efficiency standards increase the upfront costs for products that will, supposedly, lead to long-term energy savings that exceed these costs. The long-term energy savings do not always arise, and even in cases where they do, many low-income individuals cannot afford the larger upfront costs or will not use the products intensively enough to benefit from the long-term savings. Consequently, efficiency standards tend to increase the cost of living for families in states that impose the strictest mandates.

“ Whether the standard is applied to cars or fuels, the emission standards increase the costs of fuel and vehicles and are another policy that makes California and New York less affordable places for people to live and work.

In addition to appliance and equipment energy efficiency standards, most electric utilities operate programs that invest in energy efficiency projects. The utilities fund these projects via a surcharge on customer bills that are akin to taxes. Consequently, the surcharges raise the costs of electricity for ratepayers and impose net economic costs on businesses and residents of these states.

New York and California have also adopted “performance-based ratemaking” programs that are designed to remove a utility’s disincentive to invest in energy efficiency programs. The disincentive to invest in energy efficiency programs arises because energy use falls when customers become more energy efficient (the purpose of energy efficiency programs). Of course, less energy use would (all other things equal) reduce a utility’s

revenues. To remove this disincentive, both California and New York guarantee utilities that they will receive the dollar return that they would have received had the utilities not invested in energy efficiency projects. The guaranteed revenues for the utilities are financed by increasing prices on consumers. Therefore, these policies subsidize utilities at the expense of consumers who will no longer receive any financial benefits from the investments in energy efficiency.

**Motor Vehicle and Renewable Fuel Standards:** Motor vehicle and renewable fuel standards (RFS) mandate levels of GHG emissions that either cars or fuels must meet. With respect to cars, California has established the *Advanced Clean Car Program* that New York, among other states, has adopted. California’s standard requires automakers to reduce the greenhouse emissions from cars by 34 percent by 2025.<sup>10</sup> Cali-

California also has a low carbon fuels standard (LCFS). The current standard requires a 10 percent decline in the carbon intensity of all transportation fuels by 2020.<sup>11</sup> To meet this standard, California imposes fees (in the form of ‘LCFS credits’) on gasoline and diesel fuel and transfers those revenues to distributors and users of biofuels and electricity – the standards creates a subsidy for preferred energy sources at the expense of fossil fuels.

Whether the standard is applied to cars or fuels, the emission standards increase the costs of fuel and vehicles and are another policy that makes California and New York less affordable places for people to live and work.

**Electric Vehicle Subsidies:** Both California and New York subsidize the manufacture and sales of electric vehicles, above and beyond the federal taxpayer-funded credit of \$7,500 per electric vehicle. The subsidies in California include the \$5,000 rebate that purchasers of electric cars can receive from the state, as well as a voucher worth up to \$117,000 for the purchase of hybrid trucks.<sup>12</sup>

The subsidies in New York include rebates up to \$2,000 per vehicle and are available for battery electric vehicles, plug-in hybrid vehicles, and fuel cell vehicles. New York also offers a truck voucher program that offers up to \$150,000 for the purchase of CNG, hybrid, and electric class 2-8 trucks.<sup>13</sup>

Due to the high cost of electric vehicles, they are mainly purchased by upper income individuals; consequently, the subsidies are, inevitably, a wealth transfer from low- and middle-income state residents to upper-income residents who choose to purchase electric vehicles, as well as the electric vehicle companies.<sup>14</sup>

Both California and New York levy gasoline taxes that, while not implemented in response to global warming concerns, are the second and fifth highest in the nation, respectively.<sup>15</sup> The gasoline tax raises the price of gasoline relative to alternative vehicles creating another subsidy for alternative vehicles.

**Oil and Natural Gas Production Restrictions:** Beyond technology mandates, emission restrictions, and taxes, New York and California also impose production restrictions (such as fracking restrictions) that prevent these states from developing the large amounts of oil and natural gas reserves that are geologically available.<sup>16</sup> As a consequence, both states are losing potential jobs (particularly high-paying jobs), family incomes, tax revenues, and economic growth that these profitable opportunities could have created.

From an economic impact perspective, all of these policies impose restrictions on the types of energy sources that businesses and consumers are allowed to use, subsidize preferred energy sources, and increase the costs on people who use disfavored energy sources. As has been repeated throughout this section, the outcome from all of these policies is higher energy prices and less economic opportunity. It is due to these costs and lost opportunities that the claim that these policies actually promote economic growth is folly.

“ Despite the reality that economic costs cannot be wished away, advocates for the CA-NY approach claim that the policies described in the previous section can simultaneously impose additional costs on the economy and still increase economic growth.

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# The Logical Flaws Underlying the No Impact Fallacy

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**D**espite the reality that economic costs cannot be wished away, advocates for the CA-NY approach claim that the policies described in the previous section can simultaneously impose additional costs on the economy and still increase economic growth. This claim has been repeated so often that it is becoming commonly accepted wisdom. For example, according to the Public Policy Institute of California's July 2018 survey on the environment, 51 percent of the Californians surveyed believe that policies to reduce greenhouse gas emissions "will result in more jobs for state residents" even though 58 percent recognize these policies will, indeed, raise gasoline prices.<sup>17</sup>

Several analyses also allege that the growing number of mandates, subsidies, and taxes will help the environment and encourage economic growth.<sup>18</sup> Economic growth is supposedly created because the green technology subsidies (or taxes on fossil fuels) encourage the creation of new clean energy businesses that would not exist without these government interventions. These businesses purchase goods and services, hire people who will spend their money in the local economy, and create the desired products. Thus, according to these studies, the green subsidies are creating jobs and reducing greenhouse gas emissions. Morriss et al. (2009) summarized the logic similarly:

Carbon emissions are causing global warming, so emissions need to be reduced. A way to do this is to encourage non-carbon sources of energy, such as wind turbines and solar power. The result of government action will be many new jobs and a healthier environment. A two-for-one deal!<sup>19</sup>

Undoubtedly, when the government subsidizes a clean energy firm (e.g. through mandates that require a set percentage of energy be produced from renewable sources), there will be more economic activity and jobs in the renewable energy sectors. But, the creation of these jobs does not mean that there has been a net increase in employment – this is only a partial analysis.

Looking at the job impact from a static perspective, such claims only account for the economic activity and jobs created in the alternative energy sector. There are costs that occur elsewhere. First, the resources to fund the jobs in the alternative energy sector must come from somewhere. The economic activity that would have occurred had those resources not been diverted are a cost, albeit unseen cost, of the policy. Second, the stated purpose of the policy is to not simply expand energy capacity; it is to replace fossil fuels as a source of energy, particularly coal. Therefore, from a static basis all green jobs created would also need to be netted against all fossil fuel jobs lost (particularly coal). It is important to note that while job losses are part of a healthy competitive market, the losses occurring are not due to competitive forces. They are caused by government mandates.

More important, the dynamic economic impact from the policy cannot be ascertained by simply counting jobs. A famous Milton Friedman story conveys the flaws in this logic:

While traveling by car during one of his many overseas travels, Professor Milton Friedman spotted scores of road builders moving earth with shovels instead of modern machinery. When he asked why powerful equipment wasn't used instead of so many laborers, his host told him it was to keep employment high in the construction industry. If they used tractors or modern road building equipment, fewer people would have jobs was his host's logic.

“Then instead of shovels, why don’t you give them spoons and create even more jobs?”  
Friedman inquired.<sup>20</sup>

The moral of the story is that you don’t measure the economic benefit from a policy by counting the jobs that can be measured. Instead, the economic benefit is determined by the value the project creates. Take the road example. Building a needed road enables businesses to obtain their supplies quicker and for less money, increasing the local production capacity. An efficient roadway also makes it easier for goods and services to come into the locality lowering prices for the people living there. It also makes it easier for people to travel to other towns to work or sell their goods. By lowering these costs, an effective road creates long-term benefits that promotes economic growth over the long-term.

Shunning modern machinery raises the costs of making the road and delays its completion. Consequently, the benefits provided by the road are delayed. Further, more resources must be devoted toward building the road, which precludes the creation of other value-added projects. These lost projects, and the long-term value they could create, are an economic cost from shunning modern machines to build the road. Further, using a less efficient production process typically leads to a less viable roadway. This lower quality road reduces the long-term economic benefits the town will reap from building the roadway.

There is a direct parallel between the costs created when building a roadway inefficiently and the CA-NY approach to global warming policies. The greatest economic value is created when a state’s energy sources provide the highest quality, most reliable energy services at the lowest possible cost. Judged against these metrics, both California’s and New York’s global warming policies undoubtedly impose a net economic cost on the people living in these states.

As detailed in the economic cost section below (“The Economic Costs Imposed by the CA-NY Approach to Climate Policies”), energy prices in both California and New York are among the highest in the country. These excessively high prices are consistent with the expected impacts from each state’s global warming policies that include high taxes on fossil fuel energy sources, subsidies for low-emission technologies, and mandates requiring greater use of low-emission energy sources. Higher energy costs reduce the economic vibrancy of households in these states.

Advocates for stricter mandates may counter by stating that the prices for energy produced from alternative sources are now competitive with the prices for energy produced from fossil fuels. As a consequence, forcing greater use of alternative energies will not increase energy costs nor impose an adverse economic impact. And, based on the levelized cost of energy (LCOE) data from the Energy Information Administration (EIA), those assertions appear to be correct. According to the EIA, LCOE is a

convenient summary measure of the overall competitiveness of different generating technologies. It represents the per-megawatthour cost (in discounted real dollars) of building and operating a generating plant over an assumed financial life and duty cycle. Key inputs to calculating LCOE include capital costs, fuel costs, fixed and variable operations and maintenance (O&M) costs, financing costs, and an assumed utilization rate for each plant type.<sup>21</sup>

Table 1 presents the latest LCOE data from the EIA. The data illustrate that the LCOE for the alternative technologies (e.g. wind and solar), excluding the current subsidies, are similar to the LCOE for the traditional energy sources. Specifically, the unsubsidized LCOE for onshore wind power (\$48.0 / MWh) and solar power (\$59.1 / MWh) are similar to the LCOE for natural gas (between \$48.1 / MWh and \$79.5 / MWh), depending upon the type of natural gas power plant built.

**TABLE 1 EIA ESTIMATED LEVELIZED COST OF ELECTRICITY (CAPACITY-WEIGHTED AVERAGE) FOR NEW GENERATION RESOURCES ENTERING SERVICE IN 2022**

Plant Type	Total System LCOE Excluding Subsidies (\$ / MWh)
<b>Dispatchable Technologies</b>	
Conventional combined cycle (natural gas & steam)	48.3
Advanced combined cycle (natural gas & steam)	48.1
Advanced natural gas combustion turbine	79.5
Advanced nuclear	90.1
Geothermal	43.1
Biomass	102.2
<b>Non-dispatchable Technologies</b>	
Wind, onshore	48.0
Wind, offshore	124.6
Solar PV	59.1
Hydroelectric	73.9

Source: EIA

When reporting these values, the EIA categorizes them into dispatchable technologies and non-dispatchable technologies, however, and this categorization is material. Dispatchable energy generation (such as natural gas) can be used (or dispatched) upon request. Non-dispatchable technologies cannot be used upon request – wind technologies only produce power when the wind is blowing; solar technologies only produce power when the sun is shining. The differences in dispatchability change the quality of the energy services these technologies provide. As the EIA notes:

Because load must be balanced on a continuous basis, generating units with the capability to vary output to follow demand (dispatchable technologies) generally have more value to a system than less flexible units (non-dispatchable technologies), or than units using intermittent resource to operate. The LCOE values for dispatchable and non-dispatchable technologies are listed separately in the tables, because comparing them must be done carefully.

The direct comparison of LCOE across technologies is, therefore, often problematic and can be misleading as a method to assess the economic competitiveness of various generation alternatives because projected utilization rates, the existing resource mix, and capacity values can all vary dramatically across regions where new generation capacity may be needed.<sup>22</sup>

This issue was analyzed extensively by Joskow (2011).<sup>23</sup> Joskow raised several important concerns about the LCOE measure based on

a very simple point regarding the proper methods for comparing the economic value of intermittent generating technologies (e.g. wind and solar) with the economic value of traditional dispatchable generating technologies (e.g. CCGT, coal, nuclear). [Joskow shows]

that *the prevailing approach that relies on comparisons of the “levelized cost” per MWh supplied by different generating technologies, or any other measure of total life-cycle production costs per MWh supplied, is seriously flawed.* It is flawed because it effectively treats all MWhs supplied as a homogeneous product governed by the law of one price. Specifically, traditional levelized cost comparisons fail to take account of the fact that the value (wholesale market price) of electricity supplied varies widely over the course of a typical year. The difference between the high and the low hourly prices over the course of a typical year, including capacity payments for generating capacity available to supply power during critical peak hours, can be up to four orders of magnitude (Joskow 2008). We observe such a large variation in wholesale electricity prices because the demand for electricity varies widely over the hours of the year, electricity cannot be stored economically for most uses, and electricity demand and supply must be balanced continuously to maintain the reliability of the network.<sup>24</sup>

Put more simply, many products do not compete based on price alone. They also compete based on quality, and the quality of the product is often just as important as its price. While the LCOE for renewable energy sources may be similar to the LCOE for fossil fuels, there are important quality differences that are not conveyed by comparing the LCOE between alternative energy sources and traditional energy sources. Further, the quality provided by the traditional energy sources cannot yet be replicated by alternative energy sources.

The lower quality renewable energy generation also raises overall costs that are not incorporated into the LCOE figures. Due to the unreliability of non-dispatchable sources, additional capital must be deployed to build duplicative energy capacity to operate when the mandated renewable energy generation cannot meet power demand. While these additional costs are not incorporated into the LCOE for the renewable energy sources, these higher costs are incurred because non-dispatchable generation that was not technologically appropriate was mandated.

Alternative (non-dispatchable) energy sources suffer from another quality limitation that the LCOE values do not capture. Unlike dispatchable technologies that can be located where the energy is needed, non-dispatchable technologies must be located where they can generate energy. This location may, or may not, be close to where the electricity is needed. When the non-dispatchable technologies are located far from where the energy is demanded, new transmission and substation infrastructure is required to move the power from the generation point to the populated regions. These costs can be expensive, and raise the costs of these energy sources, but are not included in the LCOE values.

Consequently, the LCOE data does not illustrate that the prices for alternative energy are competitive with traditional energy sources. Forcing energy consumers to use non-dispatchable energy sources imposes economic costs on both California and New York in the form of a lower quality energy infrastructure. The consequences from their low-quality energy services include higher prices and less reliability.

“ Forcing energy consumers to use non-dispatchable energy sources imposes economic costs on both California and New York in the form of a lower quality energy infrastructure.

However, even if these dispatchability differences are ignored, California's and New York's economic policies would still have a negative economic impact. Ignoring the crucial issue of dispatchability, then the LCOE calculations would indicate that prices for alternative energy sources are competitive to prices of energy from fossil fuels.

Of course, under these circumstances, the subsidies and mandates for alternative energy sources would be unnecessary. Alternative energy sources that offer the same quality of energy at competitive prices are a viable product that would have significant competitive advantages over fossil fuels given the widespread concerns about global climate change. Therefore, if alternative energy sources were truly competitive, then the array of global climate change policies associated with the CA-NY approach would be superfluous.

Even though the policies would provide no value, the subsidies must still be funded, and companies must still comply with the mandates. Complying with mandates imposes costs on companies. Funding the government subsidies requires additional taxes that negatively impact the economy of both states in two distinct, but inter-related ways.

First, the tax harms economic growth by diminishing the returns from working, saving, and investing. Second, the tax diverts resources away from the private sector, which imposes a large opportunity cost on the economy. Instead of spending the money on the goods, services, or investment opportunities that private individuals' value, these resources are devoted toward subsidies and mandates that create no value. The subsidies and mandates create no value because, by definition, the alternative energy sources are assumed to be competitive with traditional energy sources. As Winegarden and Chura (2017) illustrated, policies that redistribute spending from more productive uses to less productive uses will, by definition, impose costs on an economy.<sup>25</sup>

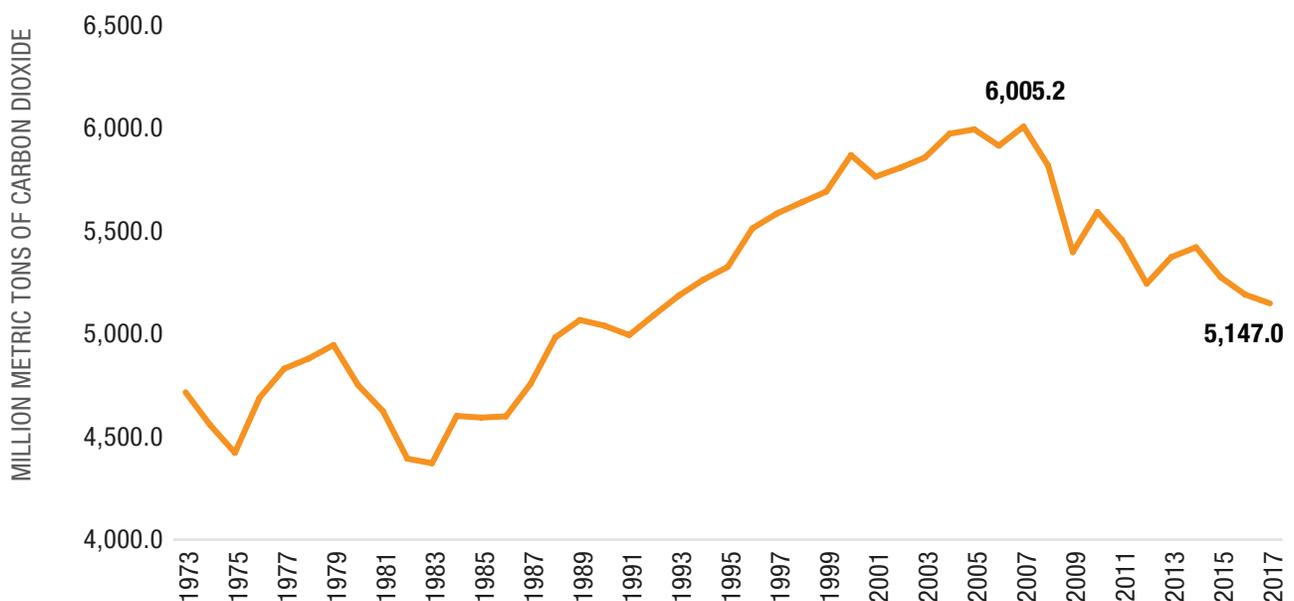
Since both California and New York are transferring money away from productive uses in the private sector and devoting them toward less productive uses in the public sector, by definition their economies are worse off as resources are devoted toward less efficient uses. These costs are in addition to the negative impact on the economy from the higher taxes necessary to fund these expenditures. Therefore, alternative energy mandates and regulations will still impose costs on the economies of California and New York even under the assumption that the alternative energy sources will not raise energy prices.

While repeating an economic fallacy may turn people into believers, it will not make a false premise true. The CA-NY approach to climate change does not promote economic growth – it imposes additional, and significant, economic costs on consumers and producers. Policies that impose additional costs on consumers and producers detract from economic growth. Therefore, accounting for just the economic impacts, the CA-NY approach to reduce greenhouse gas emissions detracts from each state's prosperity, it does not promote it.

# California's and New York's Emissions Trends Are Not Unique Within the U.S.

State and national CO<sub>2</sub> emissions trends provide important perspectives worth reviewing before presenting the economic costs associated with the CA-NY approach. With respect to U.S. emissions, 2007 is a pivotal year. CO<sub>2</sub> emissions peaked in 2007 and, as of 2017, they have declined 14.3 percent, see Figure 1.

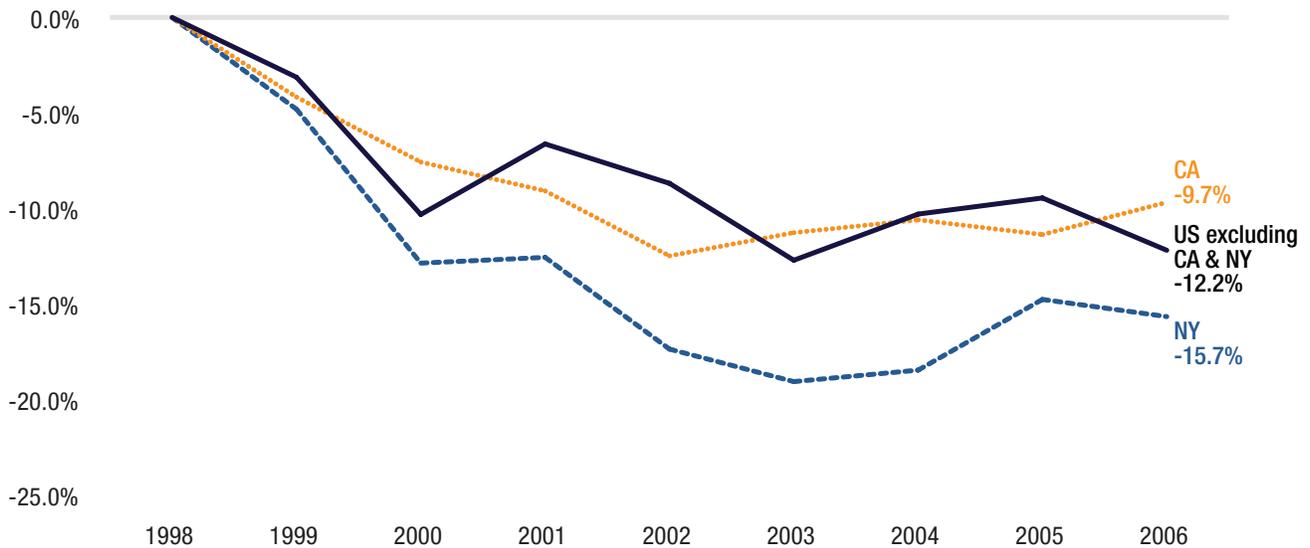
**FIGURE 1 NATIONAL CARBON DIOXIDE EMISSIONS / ANNUAL DATA, 1973 – 2017**



Source: Energy Information Administration (EIA)

Using 2007 as the benchmark year to compare the state trends, Figure 2 presents the emissions decline in California and New York relative to the decline experienced in the rest of the country through 2015 (the latest EIA state data available). Based on the carbon dioxide emissions data maintained by the EIA, California emitted 402.5 million metric tons of carbon dioxide in 2007, which declined 9.7 percent to 363.5 million metric tons of carbon dioxide through 2015.<sup>26</sup> Relative to the national benchmark, California's emissions reductions were less than the national trends excluding California and New York, which declined 12.2 percent over the same time period. Unlike California, the emissions reduction in New York exceeded the national average. Based on the EIA data, New York emitted 199.6 million metric tons of carbon dioxide in 2007, which declined 15.7 percent to 168.3 million metric tons of carbon dioxide as of 2015.

**FIGURE 2 CARBON DIOXIDE EMISSIONS RELATIVE TO 2007 IN CALIFORNIA, NEW YORK, AND THE REST OF THE COUNTRY / 2007 – 2015**

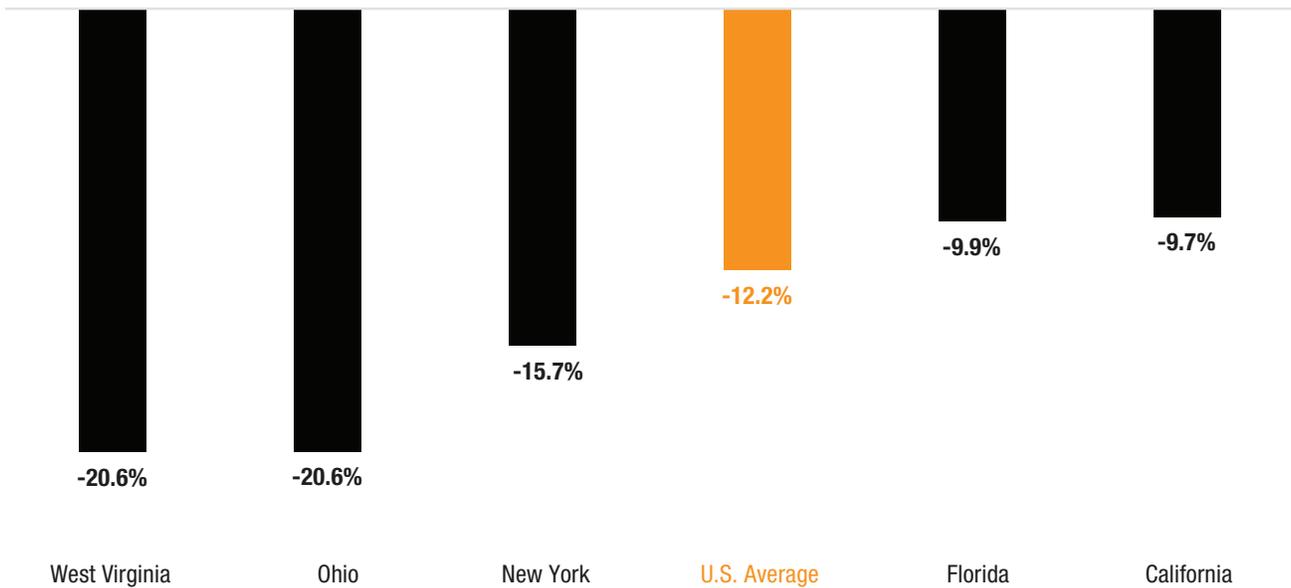


Source: EIA

The decline in CO<sub>2</sub> emissions in the other 48 states is not being driven by a small sub-set of states either. Excluding California and New York, CO<sub>2</sub> emissions have declined in 44 other states between 2007 and 2015. Further, the states with the largest declines are not necessarily the states implementing the CA-NY approach.

Figure 3 presents the change in total carbon dioxide emissions in selected states between 2007 and 2015. Three of the selected states (West Virginia, Ohio, and Florida) rank toward the middle or bottom of the Union of Concerned Scientists clean energy state rankings – these states are not implementing the CA-NY approach.<sup>27</sup> As Figure 3 indicates, large emission reductions have occurred in these states that are not implementing the CA-NY policy approach. In fact, the percentage decline in emissions in California has been less than all three of these states that the Union of Concerned Scientists have ranked lower, and both West Virginia and Ohio had larger percentage emission declines than New York. Overall, between 2007 and 2015, California’s percentage decline in emissions was 35<sup>th</sup> out of the 50 states plus Washington D.C., and New York’s was 20<sup>th</sup>. Consequently, judged against the other states, neither New York nor California are emission reduction leaders.

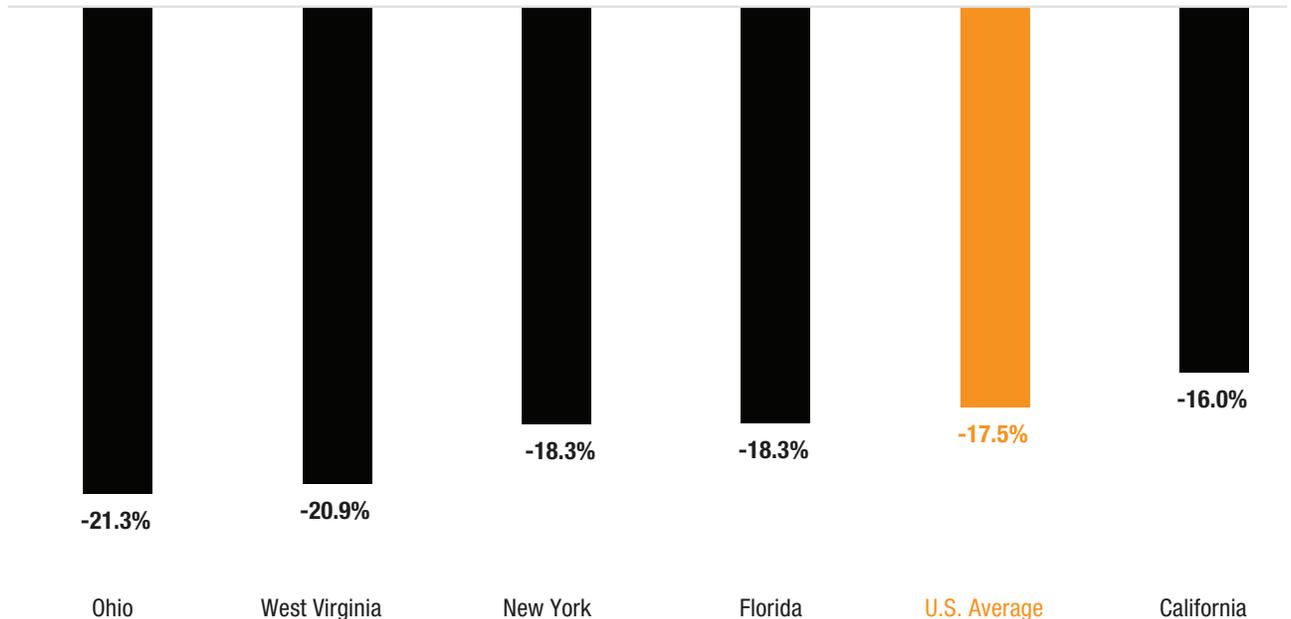
**FIGURE 3 PERCENTAGE CHANGE IN CARBON DIOXIDE EMISSIONS VARIOUS STATES / 2007 – 2015**



Source: Author calculations based on data from the EIA

The figures above do not account for the population in each state, which is an important contributor to CO<sub>2</sub> emissions. Even after adjusting for total state population, the stronger performance of West Virginia, Ohio, and Florida remain, see Figure 4. On a per capita basis, California’s decline was 33<sup>rd</sup> out of the 50 states plus Washington D.C. New York’s was 27<sup>th</sup>. Thus, on a per capita basis, both California’s and New York’s emission reductions were (at best) average relative to the rest of the country.

**FIGURE 4 PERCENTAGE CHANGE IN CARBON DIOXIDE EMISSIONS PER CAPITA VARIOUS STATES 2007 – 2015**



Source: Author calculations based on data from the EIA

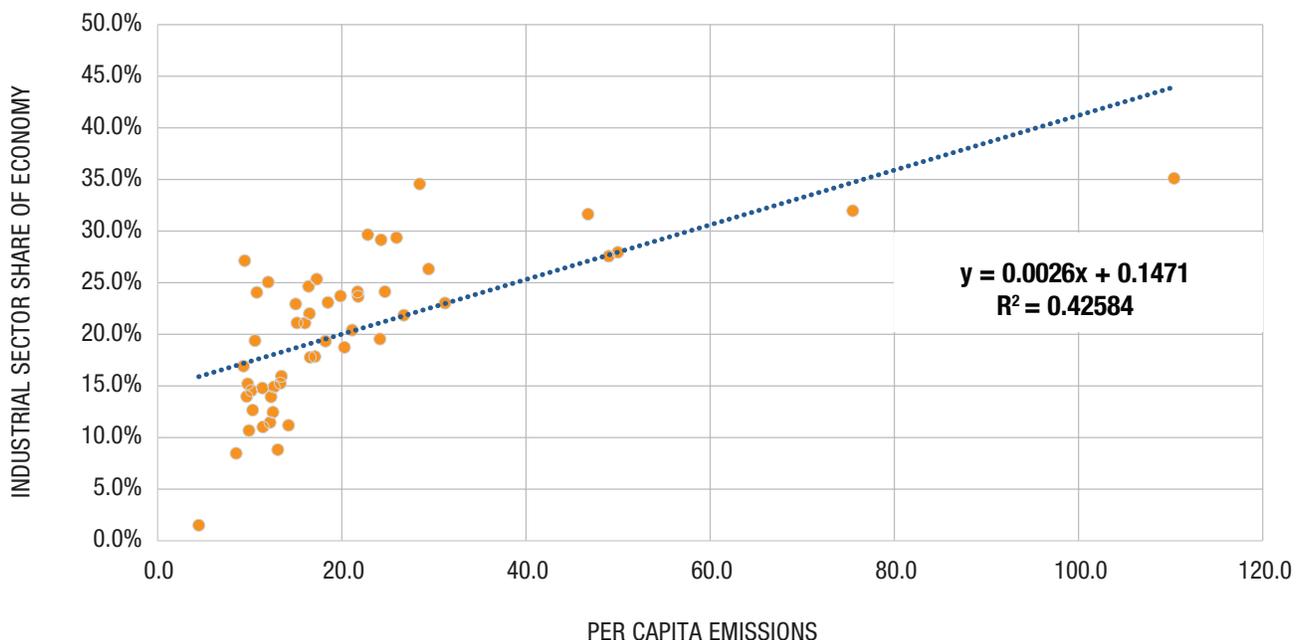
Taken together, these charts present several trends that are important to recognize when evaluating California’s and New York’s global climate change policies. Carbon dioxide emissions are falling for the entire country as a whole, not simply in the “clean energy leader” states. Consequently, the CA-NY approach is not necessary in order to enable large declines in overall emissions. In fact, as noted by the EIA, substitution of natural gas generated electricity for coal generated electricity, enabled by the fracking revolution, has been the primary driver of the broader national decline in carbon dioxide emissions.<sup>28</sup>

## Accounting for State Economic Trends

**F**ocusing only on the general emissions trends in 2015 relative to 2007 obscure the important influence that a state’s industry composition, and a state’s relative rate of economic growth rate, will have on total and per capita CO<sub>2</sub> emissions.

Starting with the issue of industry composition, it is expected that state economies that skew toward industrial activity will have more emissions per capita than state economies that skew toward the services sectors. Based on the EIA’s definition of the industrial sector,<sup>29</sup> this expected relationship holds in practice, see Figure 5. Each dot in Figure 5 represents a state. The location of each dot in the graph is determined by its level of per capita emissions (where the state is located along the x-axis (horizontal axis)) and the industrial sector’s share of the economy (where the state is located along the y-axis (vertical axis)). As the blue dotted line in Figure 5 illustrates, there is a positive relationship between these two variables, which indicates that the states whose economies skew toward the industrial sector tend to have more emissions per capita, while the states whose economies have less industrial activity tend to have fewer emissions per capita.

**FIGURE 5 RELATIONSHIP BETWEEN INDUSTRIAL SECTOR’S SHARE OF STATE ECONOMY AND STATE CO<sub>2</sub> EMISSIONS / 2015**

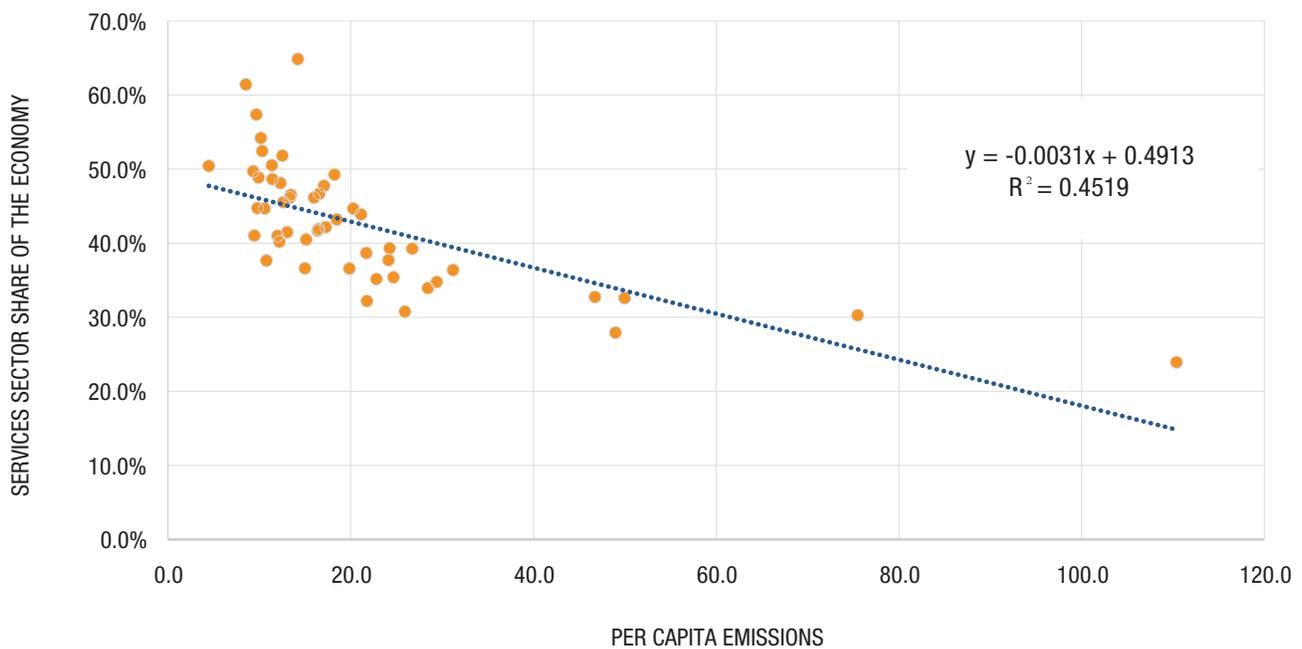


Source: Author calculations based on data from the BEA and EIA

The states where industrial activity is a smaller share of the economy also tend to be the states where the services sector is a larger share of the economy. Further, since the services sector is less energy-intensive than the industrial sector, the state economies that rely more heavily on the services sector should be expected to have fewer emissions per capita.<sup>30</sup>

Figure 6 presents the same type of relationships as Figure 5 except that each state’s per capita CO<sub>2</sub> emissions are compared to the share of each state’s economy that is attributed to the services sector. The downward sloping blue line in Figure 6 confirms that, as would be expected, the states with larger services sectors tend to emit fewer CO<sub>2</sub> emissions per capita in practice than the states with smaller services sectors.

**FIGURE 6 RELATIONSHIP BETWEEN SERVICE SECTOR’S SHARE OF STATE ECONOMY AND STATE CO<sub>2</sub> EMISSIONS / 2015**



Source: Author calculations based on data from the BEA and EIA

These considerations are important because both California’s and New York’s economy are disproportionately dependent on the services sector, and rely relatively little on the industrial sector.

For reference, 37.5 percent of the U.S. economy is attributable to the services sector, and 19.1 percent to the industrial sector. In California, the services sector comprised 49.7 percent of the state’s economy, which was the 9<sup>th</sup> largest share of all the states, including Washington D.C. New York’s economy was even more skewed toward the services sector; the services sector comprised 61.4 percent of its economy, or the 2<sup>nd</sup> highest share. The industrial sector only represented 16.9 percent (34<sup>th</sup> highest share) and 8.5 percent (50<sup>th</sup> highest share, or second lowest) of California’s and New York’s economy, respectively.

Since the economies of both states (especially New York) are skewed toward the services sector and away from the industrial sector, these states should naturally have fewer emissions per capita. The relatively large dependence on the services sector also indicates that the costs associated with the CA-NY approach will

be smaller for both California and New York relative to the states that are more heavily dependent on the industrial sector.

Ironically, due to the different production structures, California and New York will also experience additional economic costs should the states that are more heavily dependent on the industrial sector adopt the CA-NY approach. This follows because while California and New York produce relatively few industrial goods, the people living in California and New York still consume these goods. Take California's

“ Accounting for consumption patterns reveals that both California and New York are responsible for more emissions than commonly ascribed to them.

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purchases of new cars as the example. Californians registered more than 2 million new cars in 2015, 2016, and 2017. Further, 2018 is also on track to reach 2 million new cars registered as well.<sup>31</sup> This is nearly double the number of vehicles registered in 2009 (at the height of the Great Recession).

Since the vast majority of these new cars were not produced in California, the current emissions tracking does not attribute the emissions created when building these cars to California. Instead, they are attributed to Michigan, Tennessee, or Alabama, where the cars were likely built. But, it is just as valid to attribute a product's emissions to the state where the product is consumed as it is to attribute them to the state where the product is made.

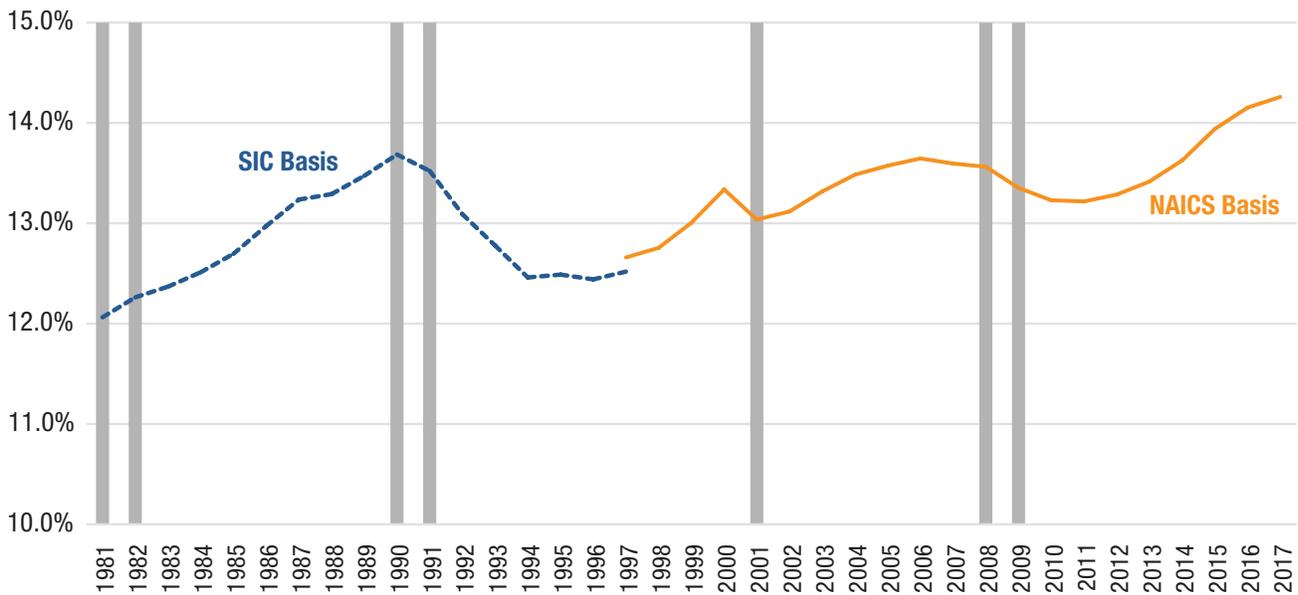
Consequently, measuring emissions based on what Californians and New Yorkers consume, emissions are actually higher than indicated by their state emission values that are based on production. An estimate by Caron et al. (2017) found that, “when attributed on a consumption basis, California's per capita emissions are over 25 percent higher than when attributed on a production basis.”<sup>32</sup>

Accounting for consumption patterns reveals that both California and New York are responsible for more emissions than commonly ascribed to them. It also reveals that should the industrial states apply the CA-NY policies, then both California and New York would also suffer the economic consequences because the industrial products that residents of California and New York are currently consuming from the industrial states would become more expensive. The higher costs would impact Californians and New Yorkers in addition to the residents of the states adopting the new regulations.

Put differently, currently Californians and New Yorkers escape some of the costs imposed by their global warming policies by importing goods into the state that do not contain these costs. If these *sourcing* states were to apply the same policies, then there would be no escape for the residents of California and New York. They would, consequently, have to bear the full economic cost of their policies.

It is also necessary to account for states' unique growth patterns, which is more relevant for California than New York. For example, California's economy (as measured by state GDP) has been growing faster than the country overall since the end of the Great Recession. Proponents of the CA-NY approach argue that California's accelerated growth demonstrates that the state's global warming policies are not harming economic growth. There is an important caveat to their claims, which Figure 7 illustrates. Figure 7 presents California's state GDP as a share of national GDP over the past four decades (the discontinuity in the figure is due to the change in industrial classification that impacts the BEA data as of 1997).

**FIGURE 7 CALIFORNIA'S SHARE OF THE NATIONAL ECONOMY / 1981 THROUGH 2017**



Source: Author calculations based on BEA data

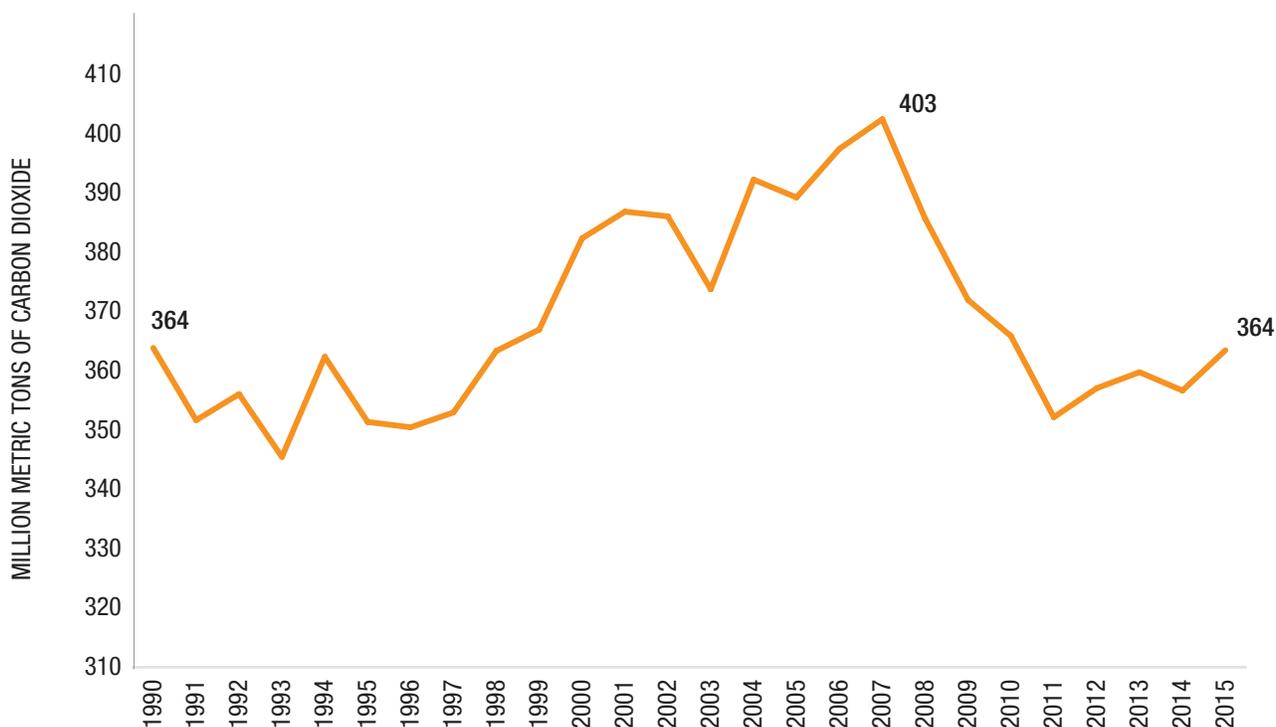
Figure 7 demonstrates that California's share of the U.S. economy is traditionally very volatile. During times of economic growth, California's growth rate exceeds the national average causing California's share of the national economy to grow. Recessions (represented by the gray bars in Figure 7) are unusually tough on Californians, however, causing the state's economy to crash relative to the U.S. economy (typically, the crash persists long after the recession officially ended). While California's relative economic growth during the current boom is impressive, it is premature to claim long-term success until after California's outperformance survives a national recession.

While it is easier to predict the past than forecast the future, if history is a guide, then California's economy will shrink relative to the national economy during, and following, the next national recession. Ultimately, the current business cycle has to run its course before it is known with certainty whether California is sustainably growing faster than the national average or not.

Perhaps more important for this discussion, regardless of whether California's economy will still have expanded relative to the country once the current business cycle has run its course, the state's emissions trends tend to follow its volatile economic growth path, which can be visualized by comparing the trends in Figures 7 and 8.

Figure 7 illustrates that during the early- to mid-1990s, California's economic growth rate lagged the national recovery. During this time of relative economic decline, Figure 8 illustrates that California's emissions were also flat. Once California's economy began growing faster than the national average during the mid- to late-1990s (see Figure 7), California's emissions began growing robustly too (see Figure 8).

**FIGURE 8 CALIFORNIA'S CO<sub>2</sub> EMISSIONS / 1990 THROUGH 2015**



Source: EIA

This connection between California's relative economic growth rate and its growth in carbon dioxide emissions continued throughout the 2000s and 2010s. California's emissions fell significantly between 2007 and 2011 in response to the Great Recession, which was more burdensome in California compared to the rest of the country. Once California's economic recovery finally began, the decline in the state's CO<sub>2</sub> emissions similarly ended. This close relationship between the change in California's emission and its economic performance throughout the business cycle is summarized in Table 2.

**TABLE 2 CHANGES IN CALIFORNIA'S CO<sub>2</sub> EMISSIONS COMPARED TO CALIFORNIA'S RELATIVE ECONOMIC PERFORMANCE**

	Change in California Emissions	Change in California Share of National GDP
1990 - 1996	-3.7%	-1.2%
1996 - 2007	14.8%	1.2%
2007 - 2011	-12.5%	-0.4%
2011 - 2015	3.2%	0.7%

Source: Author calculations based on data from the BEA and EIA

The time periods in Table 2 align with California's distinct emission trends that are visible in Figure 8. As Table 2 makes clear, there is a strong relationship between California's emissions and its relative growth rate.

Accounting for California’s and New York’s relative emissions reductions, their economic composition, and relative rate of economic growth, provide important lessons for other states regarding the relative efficacy of the CA-NY approach to global warming policies.

First, there is no evidence that the CA-NY approach reduces emissions more effectively than other approaches, such as greater use of natural gas in lieu of coal that do not require burdensome and costly mandates. In fact, states like West Virginia and Ohio, which have not adopted the CA-NY approach, have experienced greater emission reductions than both California and New York since 2007.

Second, the measured emissions for both California and New York should be (and are) lower than the U.S. average based on the structure of their economies, and their current growth patterns (e.g. California).

Third, emissions based on consumption patterns also matter. Both California and New York import a larger amount of goods from other states (and countries) and these goods have a large amount of CO<sub>2</sub> emissions attributed to them. If emissions were measured based on the consumption of residents, not the production in the state, both California’s and New York’s CO<sub>2</sub> emissions would be much higher than current measures indicate.

These considerations raise serious doubts regarding the efficacy of the CA-NY approach in general, and particularly as a useful model for other states to implement, especially those states with meaningfully different economic structures. This conclusion is only strengthened once the economic costs that both California and New York are enduring are considered.

“ These types of affordability issues that are created by California’s and New York’s global climate change policies that target electricity costs are noticeable in their electricity prices.

## The Economic Costs Imposed by the CA-NY Approach to Climate Policies

In light of the widespread decline in GHG emissions in states that do not impose the CA-NY approach to global climate change policies, the economic costs that California and New York are already bearing due to these policies is even more problematic. The costs include an unaffordable cost of living, rising level of poverty, and an exodus of businesses and families from both states.

### *Higher Energy Costs*

The entire purpose of cap-and-trade and renewable mandate policies is to increase the price of energy. As the Congressional Research Service (CRS) concluded “to some extent, a carbon tax and a cap-and-trade program would produce similar effects: Both are estimated to increase the price of fossil fuels, which would ultimately be borne by consumers, particularly households.”<sup>33</sup>

In an examination of California’s cap-and-trade and renewable mandate program, Lesser (2015) concluded that “California households’ electricity prices have risen as a result of the state’s renewable-energy mandates and carbon cap-and-trade program – and will likely continue to rise at an even faster rate in coming years.”<sup>34</sup>

In an examination of RGGI, Stevenson (2018) similarly concluded that:

RGGI allowance costs added to already high regional electric bills. The combined pricing impact resulted in a 12 percent drop in goods production and a 34 percent drop in the production of energy-intensive goods. Comparison states increased goods production by 20 percent and lost only 5 percent of energy-intensive manufacturing. Power imports from other states increased from 8 percent to 17 percent.<sup>35</sup>

Beyond the higher electricity prices, Stevenson also found that “there were no added emissions reductions or associated health benefits from the RGGI program” and that “spending of RGGI revenue on energy efficiency, wind, solar power, and low-income fuel assistance had minimal impact.”<sup>36</sup>

With respect to renewable energy mandates (aka renewable portfolio standards or RPS), a study sponsored by the Los Angeles Department of Water and Power (LADWP), Pacific Gas and Electric Company (PG&E), Sacramento Municipal Utilities District (SMUD), San Diego Gas & Electric Company (SDG&E), and Southern California Edison Company (SCE) examined the impacts from alternative renewable portfolio standards in California – 33 percent, 40 percent, and 50 percent.<sup>37</sup> The analysis found that a 33 percent RPS would raise utility rates between 6.0 percent and 8.0 percent; a 40 percent RPS would increase costs by an additional 3.2 percent; and, a 50 percent RPS would further increase costs by an additional 9.0 percent to 23.0 percent.<sup>38</sup>

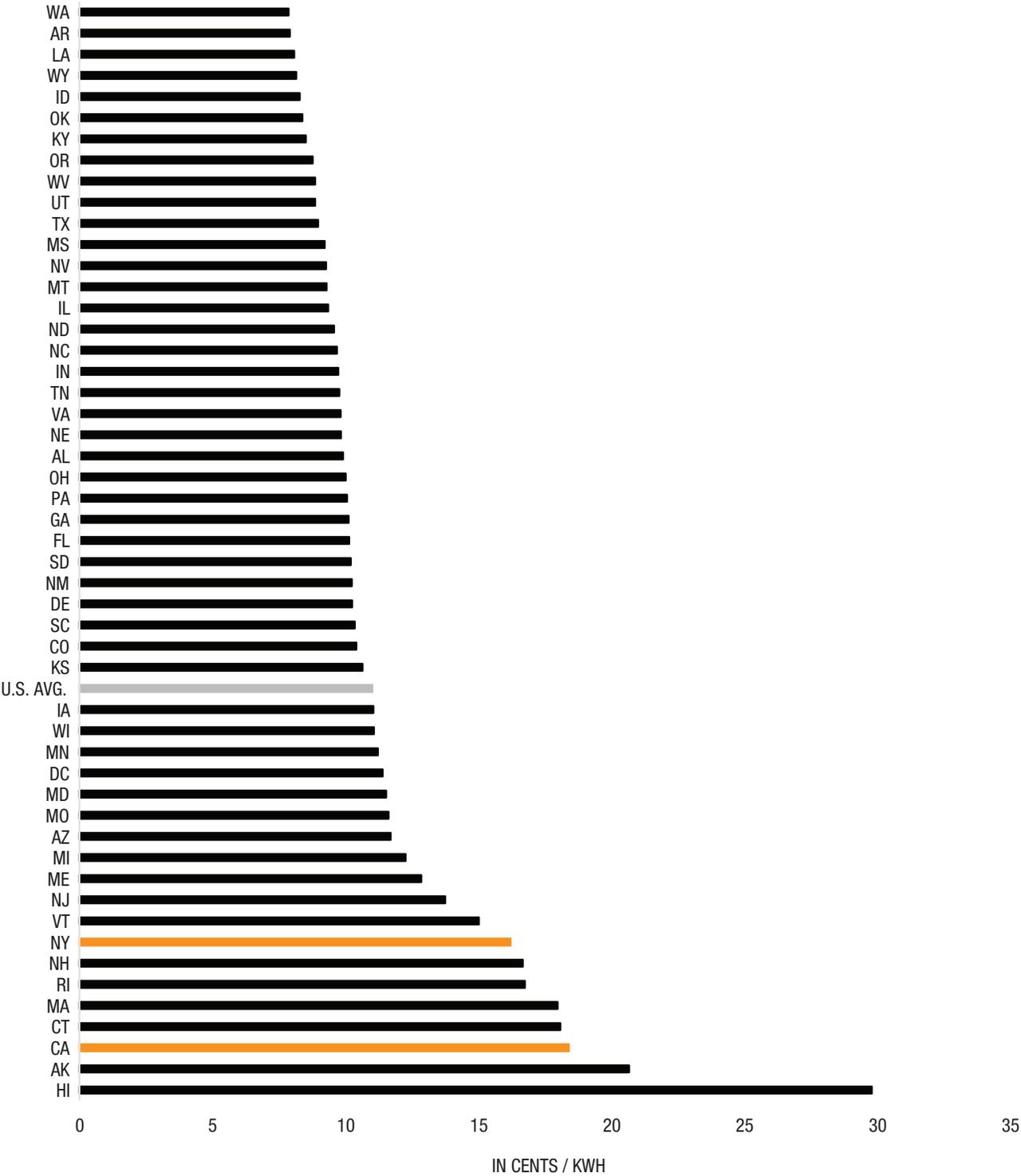
Consistent with these findings, an evaluation of Washington state’s RPS program that would require 15 percent of its energy be produced from renewable sources found that the program would raise energy rates by at least 13 percent by 2020, and cost the average household an additional \$170 per year.<sup>39</sup> In total, Washington state’s 15 percent RPS is expected to cost electricity consumers \$1.22 billion, eliminate 8,650 jobs, and reduce disposable personal income by \$1.0 billion.<sup>40</sup>

These types of affordability issues that are created by California’s and New York’s global climate change policies that target electricity costs are noticeable in their electricity prices.

The average electricity prices in California are the highest in the continental United States, 67.1 percent higher than the national average and 81.4 percent higher than the national median. New York’s energy prices are the 6<sup>th</sup> highest in the continental United States, and the states with higher costs all implement policies that are similar to New York and California (Connecticut, Massachusetts, Rhode Island, and New Hampshire). New York’s average electricity prices are 47.2 percent higher than the national average and 59.8 percent higher than the national median.

The EIA’s electricity price data confirm that, thanks to the CA-NY global climate change policies, Californians and New Yorkers pay excessively high costs for their electricity, despite being blessed with an abundance of cheap hydropower unavailable to most other regions, and despite having a relatively dense population that (all other things being equal) reduces the average cost to transmit and deliver electricity for each customer.

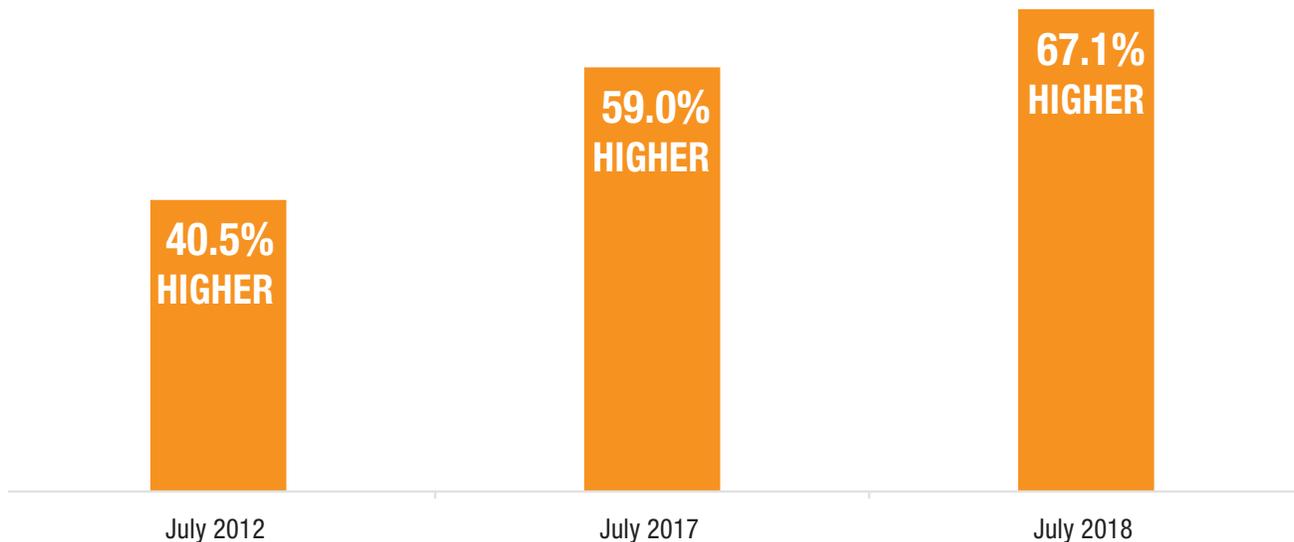
**FIGURE 9 AVERAGE RETAIL ELECTRICITY PRICES, ALL SECTORS, BY STATE AS OF JULY 2018**



Source: EIA

In California, the problem of unaffordable electricity prices predates its cap-and-trade policies. However, as Figure 10 demonstrates, electricity prices in California have become less affordable relative to the average electricity prices in the U.S. since implementing AB 32. Prior to AB 32 (in 2012), California's average electricity prices were 40.5 percent more expensive than the average electricity prices in the U.S. As of July 2018, California's electricity prices became even more expensive relative to the U.S. average – they are now 67.1 percent more expensive. The growing unaffordability of California's electricity prices is consistent with the expected impact.

**FIGURE 10 CALIFORNIA'S AVERAGE RETAIL ELECTRICITY PRICES BECOMING MORE EXPENSIVE RELATIVE TO AVERAGE U.S. RETAIL ELECTRICITY PRICES**

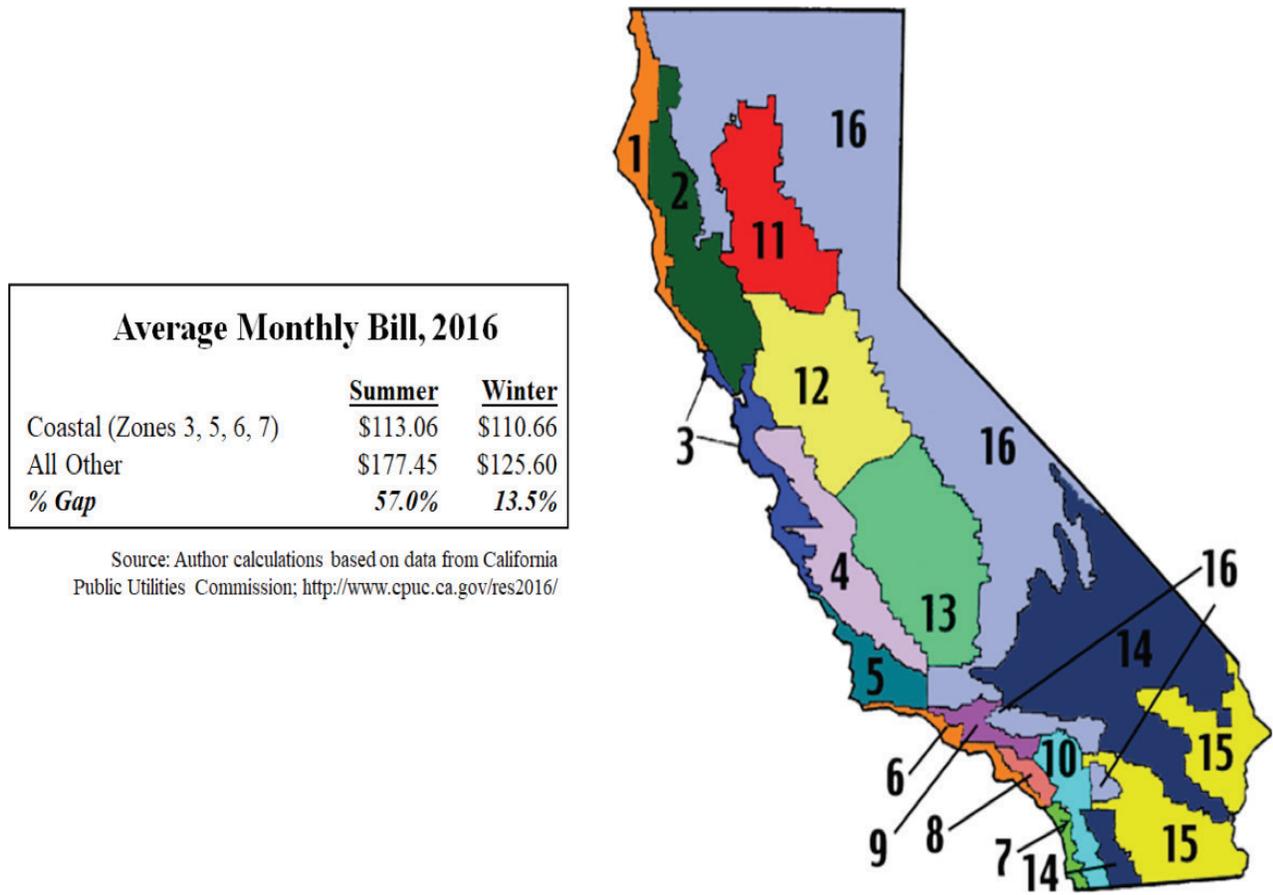


Source: EIA

It is also important to note that coastal California households do not need to use their home heating and cooling systems as extensively as households in other parts of the state due to California's temperate climate along the coast. Since less energy use is required, these communities' climatic advantage dampens the impact from the global warming policies relative to the rest of the state.

California's inland and rural communities also tend to be lower income, so the economic burden on these communities is magnified. Based on the 2016 bill data statistics from the California Public Utilities Commission (CPUC), compared to the rest of California, the utility bills for wealthier coastal Californians (defined as the CPUC zones from San Francisco down to San Diego) were 57.0 percent smaller during the summers, and 13.5 percent smaller during the winters, see Figure 11.<sup>41</sup>

**FIGURE 11 CALIFORNIA'S AVERAGE MONTHLY BILL BETWEEN COASTAL COMMUNITIES AND THE REST OF THE STATE / 2016\***



Source: CPUC

\*The map is copied from the CPUC to illustrate the boundaries of the CPUC zones. Monthly bill data exclude income-qualified customers participating in California Alternate Rates for Energy (CARE) program.

Unlike the temperate parts of California, all of New York must endure hot summers and cold winters. Like California, a large part of New York is unique, however; 43 percent of all New Yorkers lives in New York City where the average residence is 866 sq. ft.<sup>42</sup> For comparison, the average U.S. home is 2,555 sq. ft.<sup>43</sup> It obviously costs less to heat smaller homes in the winter and cool smaller homes in the summer. New York's smaller average home size creates the incongruous outcome that New York has the third highest residential electricity rates (as opposed to the total retail electricity rates examined in Figure 9) but the 46<sup>th</sup> highest residential electricity consumption.<sup>44</sup>

This seemingly inconsistent result occurs because New Yorkers average electricity consumption is 33.2 percent less than the national average.<sup>45</sup> Without the lower electricity usage that is due to New York's smaller average home size, New Yorkers would be spending significantly more on their electric bills. To quantify this difference, applying New York's average cost per k/Wh to the average U.S. electricity consumption results in a monthly average bill of \$159.11, or 50.1 percent higher than the current average bill of \$106.00.

“ It is also important to note that coastal California households do not need to use their home heating and cooling systems as extensively as households in other parts of the state due to California's temperate climate along the coast.

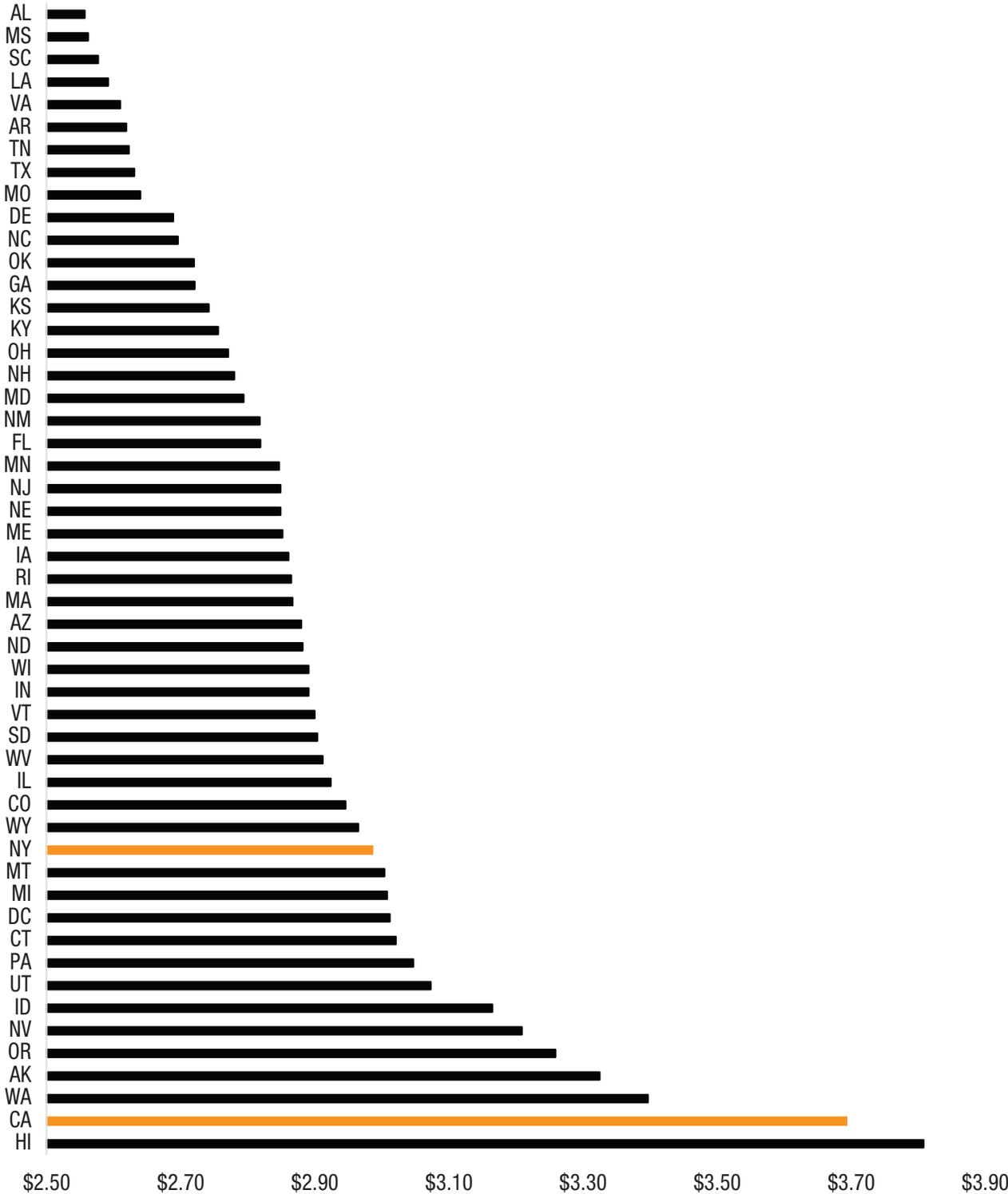
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These data for California and New York highlight several important impacts regarding policies such as cap-and-trade and renewable energy mandates. First, unique factors in California and New York dampen the costs from these policies on many state residents – perhaps illustrating why these policies are politically palatable. Second, while many residents in both states are protected from the largest economic impacts, many other residents are not. As the residents who tend to bear the economic burdens also tend to have lower incomes, the global warming policies are imposing a large regressive burden on the people living in these states. Third, the impact on the lower income households foreshadow the impact that other states will face if they adopt the CA-NY approach. A much larger share of households in states that do not benefit from coastal California's climatic advantages or the smaller housing sizes (if that

is a benefit) in New York City will face higher energy bills and, consequently, larger economic burdens than what either California or New York are currently experiencing.

Just as with electricity prices, fuel mandates (including low-carbon fuel standards in California) and high gasoline taxes (California's 55.22-cent gasoline tax is the second highest rate in the country and New York's 45.76-cent gasoline tax is the fifth highest rate in the country)<sup>46</sup> have led to less affordable gasoline prices in both states. As of September 2018, California had the second highest gasoline prices in the country, with only Hawaii having higher gasoline costs, and New York had the 14<sup>th</sup> highest gasoline prices in the country see Figure 12. Studies attribute a substantial portion of these excessively high gasoline prices to the regulatory burdens.<sup>47</sup>

**FIGURE 12 AVERAGE REGULAR GASOLINE PRICES BY STATE AS OF SEPTEMBER 28, 2018**



Source: Author calculations based on AAA gasoline price data, accessed 9/28/2018

Comparing California’s and New York’s consumption and expenditure data to the U.S. average consumption and expenditure data provides additional perspective on the aggregate costs that these global warming policies are imposing.<sup>48</sup>

According to the EIA, California consumed 7,830 trillion Btu of energy in 2016, spending \$112.9 billion on these purchases. These costs would be much higher if they included California’s myriad state and local taxpayer subsidies of “green” energy. This equates to a cost of \$14.41 per million Btu of energy consumed. Table 2 presents these data, by end-use sector, for California’s current energy expenditures, energy consumption, and energy expenditures per million Btu as of 2016.

**TABLE 2 CALIFORNIA’S 2016 ENERGY EXPENDITURES AND CONSUMPTION BY END-USE SECTOR**

	2016 Energy Expenditures (in billions)	2016 Energy Consumption (trillion Btu)	2016 Energy Expenditures / Million Btu
Residential	\$20.9	1,384	\$15.13
Commercial	\$21.2	1,477	\$14.33
Industrial	\$13.9	1,853	\$7.48
Transportation	\$56.9	3,116	\$18.25
TOTAL	\$112.8	7,830	\$14.41

Source: EIA

While Californians had to spend \$14.41 per million Btu for their energy, the average American spent significantly less – \$10.67. Put differently, due to the CA-NY approach, Californians had to spend 35.1 percent more for energy than the U.S. average. If California’s global warming policies did not inflate the state’s energy prices, and instead if California’s total energy expenditures per million Btu simply equaled the U.S. average for each of the end-use sectors listed in Table 2, then Californians could have purchased the exact same amount of energy in 2016 but saved nearly \$21.2 billion – or 0.8 percent of California’s GDP. Table 3 presents the logic behind these potential savings.

**TABLE 3 CALIFORNIA’S 2016 POTENTIAL ENERGY EXPENDITURES AND SAVINGS BASED ON AVERAGE U.S. ENERGY PRICES (STATIC ANALYSIS)**

	U.S. 2016 Expenditures / Million Btu	Potential CA Expenditures (in billions)	CA Excess Expenditures (in billions)
Residential	\$11.88	\$16.4	\$4.5
Commercial	\$9.94	\$14.7	\$6.5
Industrial	\$5.41	\$10.0	\$3.8
Transportation	\$16.22	\$50.5	\$6.3
TOTAL		\$91.7	\$21.2

Source: Author calculations based on EIA data

Column 2 in Table 3 presents the average energy expenditures per million Btu in the U.S. during 2016. Column 3 recalculates California’s total energy expenditures for 2016 based on the state’s actual consumption patterns in million Btu and the U.S. average expenditures per million Btu. Column 4 presents the total potential savings, which is the actual energy expenditures reported in Table 2 minus the potential energy expenditures calculated in Table 3.

Repeating these potential savings for New York, New York consumed 3,661 trillion Btu of energy in 2016, spending \$50.1 billion on these purchases (like California, these costs would be higher if they included New York’s myriad state and local taxpayer subsidies of ‘green’ energy). This equates to a cost of \$13.67 per million Btu of energy consumed. Table 4 presents these data, by end-use sector, for New York’s current energy expenditures, energy consumption, and energy expenditures per million Btu as of 2016.

**TABLE 4 NEW YORK’S 2016 ENERGY EXPENDITURES AND CONSUMPTION BY END-USE SECTOR**

	2016 Energy Expenditures (in billions)	2016 Energy Consumption (trillion Btu)	2016 Energy Expenditures / Million Btu
Residential	\$15.5	1,035	\$15.01
Commercial	\$13.9	1,112	\$12.46
Industrial	\$2.8	381	\$7.45
Transportation	\$17.8	1,133	\$15.74
<b>TOTAL</b>	<b>\$50.1</b>	<b>3,661</b>	<b>\$13.67</b>

Source: EIA

The \$13.67 per million Btu implies that New Yorkers spent 28.1 percent more for their energy than the U.S. average. Without the price inflation due to the CA-NY approach, New Yorkers could have purchased the exact same amount of energy in 2016 but saved nearly \$6.3 billion – or 0.4 percent of New York’s GDP. Table 5 presents the logic behind these potential savings.

**TABLE 5 NEW YORK’S 2016 POTENTIAL ENERGY EXPENDITURES AND SAVINGS BASED ON AVERAGE U.S. ENERGY PRICES (STATIC ANALYSIS)**

	U.S. 2016 Expenditures / Million Btu	Potential NY Expenditures (in billions)	NY Excess Expenditures (in billions)
Residential	\$11.88	\$12.3	\$3.2
Commercial	\$9.94	\$11.1	\$2.8
Industrial	\$5.41	\$2.1	\$0.8
Transportation	\$16.22	\$18.4	-\$0.6
<b>TOTAL</b>	<b>\$11.96</b>	<b>\$43.8</b>	<b>\$6.3</b>

Source: Author calculations based on EIA data

These cost differentials are not a comprehensive accounting of the costs consumers and businesses are bearing either. For example, the fiscal burden from paying billions of dollars on manufacturing and consumer subsidies for green products (e.g. taxpayer expenses to fund California’s bullet train or New York’s grants to solar manufacturing facilities) are not included. As another example, California’s solar mandates on new home construction, once these become binding, will increase the costs of purchasing a new home and will reduce people’s disposable incomes net of housing costs, with a particularly burdensome impact on lower-income households. These costs are also excluded.

While this section has focused on the impact on energy costs, the CA-NY global warming policies also jeopardize the energy supply's quality. Policies such as renewable mandates encourage the construction of more solar and wind technologies regardless of their impact on the stability of energy supplies. However, because these alternative sources are non-dispatchable (see Table 1), they can create stability/quality risks for the energy grid. The problem of overgeneration exemplifies these risks.

Over-generation results because renewable sources, such as solar panels during a sunny day, will sometimes (often depending on the location) collectively generate more energy than the grid can absorb. If these energy supplies are not exported or dissipated as heat, this over-generation can damage generators and motors connected to the grid. While technological advancements for storage technologies could address the over-generation risks eventually, these solutions do not yet exist. Therefore, care must be taken to ensure that these problems are effectively managed. Neither California's nor New York's renewable mandates show any indication that they account for these risks to the grid and could, therefore, create significant risks to the energy supply's stability.

“ Given current technological constraints, traditional power plants are still needed to generate energy when renewables cannot.

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Greater use of the non-dispatchable technologies also harms the quality of the energy grid by destabilizing the traditional fossil fuel power plants. Given current technological constraints, traditional power plants are still needed to generate energy when renewables cannot. But, high renewable capacity (such as would be required to meet their near-term goals) eliminates/significantly reduces the required output from these fossil fuel power plants during sunny or windy days. The required output would spike, however, during cloudy or non-windy days. Consequently, fossil fuel power plant usage would vary significantly, and unpredictably.

Problems arise because the traditional energy sources are not currently built to cheaply increase and decrease the amount of electricity generated (sometimes quite rapidly) in response to the less predictable generation provided by renewable energy sources.<sup>49</sup> An outsized addition of renewable energy sources onto the grid will, consequently, lead to higher operating and maintenance costs and reduced efficiencies of the traditional energy sources. Since these sources are still required to ensure customers have continuous access to energy, a lower-quality/higher-cost energy sector results. Put differently, forcing renewable sources to excessively high capacity levels decreases the efficiency of traditional energy sources and raises the costs of electricity regardless of the costs of the renewable sources, and could inflict structural damages on the electric grid.

As another example of the declining energy quality, the U.S. Energy Information Administration (EIA) estimates that California now imports more than one-fourth of its electricity from out of state, some from coal-fired and gas-fired power plants.<sup>50</sup> California's growing energy imports illustrate that the energy infrastructure that is emerging in response to California's restrictive energy mandates is incapable of supporting current energy needs. Therefore, the environmental impacts from California's policies are less

than they appear. Further, if all states followed the California path (e.g. there are no other states to provide backup energy production), then the economic consequences would be even greater.

California's large energy imports raise another question regarding renewable mandates. In practice there is no way to know the source for the electricity used by a specific consumer. Excluding Texas, the energy grids connect many different producers across multiple states to millions of consumers. As *Choose Energy* explains, "because the abundance of these sources varies by state and location, you cannot select the source of your renewable energy, unless you install solar panels. That said, all electricity works the same. There's no difference between coal, wind, nuclear, or solar in terms of the quality of electricity or its ability to power your refrigerator. In fact, most electricity running into your home is a combination of multiple sources."<sup>51</sup>

One way for California or New York to claim they have used renewable energy is to purchase renewable energy credits (RECs). RECs document that a renewable energy source has sold power into the grid. Once the electricity has been sold into the grid, the renewable energy producer can sell a REC (for additional revenue) to an entity that wants to claim it is using renewable energy. Of course, the entity who purchased the REC did not necessarily consume or "use" renewable energy. It provided extra revenues to a producer of renewable energy to "lay claim" to the electricity the renewable energy producer sold onto the grid, generally at the prevailing market price at the time that it was produced, which does not necessarily match the time (or location) at which it was consumed. Daniel Press, professor and chair of the Environmental Studies Department at the University of California, Santa Cruz, notes that "according to the National Renewable Energy Lab of the U.S. Department of Energy, some 13,000 customers bought 10.5 billion certificates in 2007. Nobody knows exactly what these costs are, but the lab's best estimates range from \$100 million to \$500 million."<sup>52</sup>

The purpose of RECs is to create another renewable subsidy to increase the amount of electricity produced by renewable sources. There are lots of uncertainties regarding RECs. First, since the sale of the REC is a different transaction from the sale of energy, fraud is a real threat.<sup>53</sup> There are also questions that arise due to dispatchability issues. For example, solar energy produced on a sunny day will sometimes (often?) exceed the amount of energy demanded during the daytime while the sun is shining. This excess energy production still counts for purposes of the REC even though the energy produced was unnecessary.

The problem with RECs demonstrates that renewable mandates are more difficult to confirm than is commonly realized, and, in practice, the share of renewable energy actually used could be lower than the mandates indicate. These uncertainties raise questions regarding the actual benefits (in terms of less emissions) renewable mandates are capable of generating.

### *The Economic Costs Caused by Unaffordable Energy*

The higher energy costs caused by the global climate change policies of California and New York are already harming their economic well-being. Paramount among these consequences are:

- The hardships these excess energy costs impose on low- and middle-income families;
- The impact from high energy costs on discouraging new business formations or capital investment in existing businesses, and encouraging greater migration away from California and New York; and,
- The broader impact on each state's overall business climate.

The mandates associated with the CA-NY approach directly increase the costs of energy across a wide range of sources imposing a disproportionate burden on low-income families. In a 2007 report, the Congressional Budget Office concurred with this conclusion stating that “most of the cost of meeting a cap on CO<sub>2</sub> emissions would be borne by consumers, who would face persistently higher prices for products such as electricity and gasoline. Those price increases would be regressive in that poorer households would bear a larger burden relative to their income than wealthier households would.”<sup>54</sup>

“ The mandates associated with the CA-NY approach directly increase the costs of energy across a wide range of sources imposing a disproportionate burden on low-income families.

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Winegarden and Specht (2016) evaluated the regressive impacts of the Clean Power Plan, which was a federal mandate that would have required both California and New York to implement many of the global warming policies that the states are voluntarily implementing.<sup>55</sup>

Winegarden and Specht found that based on the historical long-run price sensitivity of consumers, the average annual energy expenditures for a California household would equal \$1,159 or 1.92 percent of the 2014 median household income; these burdens would range from 0.63 percent of the median household income in the upper-income parts of San Mateo County to 16.98 percent of the median household income in the lower-income parts of San Luis Obispo County.<sup>56</sup> In New York, the average annual energy expenditures for a household would increase to \$1,554, or 2.86 percent of the median household income. The burdens would range from 0.84 percent in the upper-income parts of Richmond County, to 11.44 percent in the lower-income parts of Onondaga County.<sup>57</sup> Energy costs approaching the levels in the lowest income parts of both states are clearly unaffordable and unsustainable.

Examining California specifically, Lesser (2015) similarly found that “in 2012, nearly 1 million California households faced “energy poverty”— defined as energy expenditures exceeding 10 percent of household income. In certain California counties, the rate of energy poverty was as high as 15 percent of all households.”<sup>58</sup>

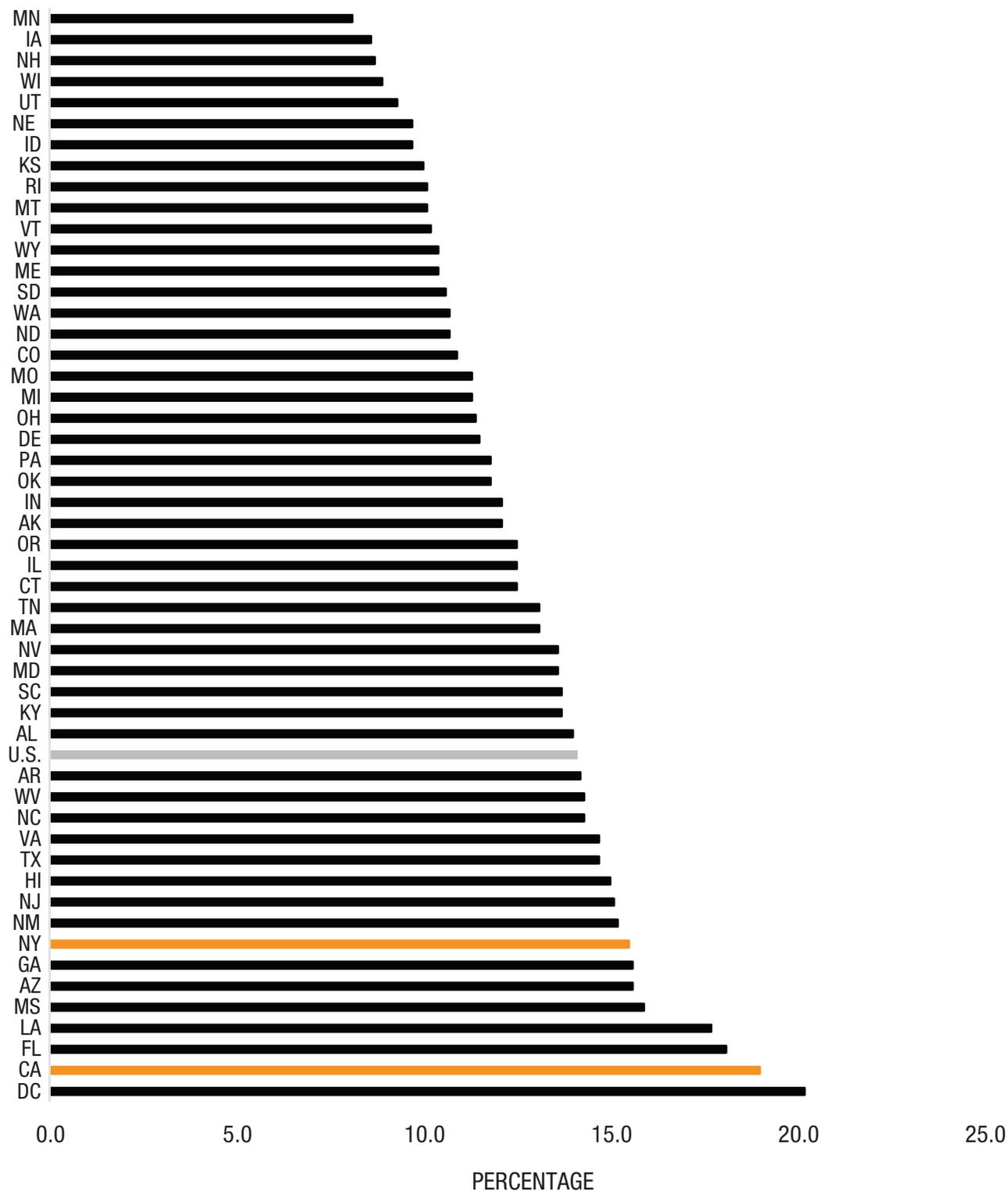
These data indicate that, while the unaffordability problems of California and New York are caused by many policies, their global warming policies are important contributors. The adverse economic consequences from the high cost of living in these states are demonstrated by the U.S. Census Bureau’s supplemental poverty rate. The supplemental poverty rate measures poverty by accounting for

family resources and expenses [that are] not included in the official measure as well as geographic variation. First, it adds the value of in-kind benefits that are available to buy basic goods to cash income. In-kind benefits include nutritional assistance, subsidized housing, and home energy assistance. Then it subtracts necessary expenses for critical goods and services not included in the thresholds from resources. Necessary expenses that are subtracted include income taxes, Social Security payroll taxes, child care and other work-related expenses, child support payments to another household, and contributions toward the cost of medical care and health insurance premiums.<sup>59</sup>

In combination with other cost-inflating policies, the global warming policies have contributed to California’s highest state poverty rate in the country (only Washington D.C. has a higher supplemental poverty rate) and New York’s 7<sup>th</sup> highest state poverty rate in the country, see Figure 10. Perhaps most important, California has the highest gap between its official poverty rate and its supplemental poverty rate, and New York has

the 9<sup>th</sup> highest gap. These differences indicate that the poverty problem in both California and New York is a cost of living problem as much as an income problem.

**FIGURE 13 SUPPLEMENTAL POVERTY RATE BY STATE / 3-YEAR AVERAGE OVER: 2015, 2016, AND 2017**



Source: U.S. Census

The growing unaffordability problem is reducing the economic competitiveness of both California and New York. In California, a 2018 report by the Legislative Analyst’s Office, citing U.S. Census data, noted that California lost 1 million residents to domestic migration between 2007 and 2016 – driven by an exodus of families with kids and people with a high school education.<sup>60</sup> Lower-income residents are also fleeing. Boding ill for the future, the intention to leave California persists. According to the Bay Area Council,

46 percent of voters are ready to leave in the next few years, up from 40 percent last year and 34 percent in 2016.

And once again, millennials are leading the charge for the doors with 52 percent saying they will be seeking greener pastures in the next few years, up from 46 percent in 2017. Renters, people without college degrees and those spending 50 percent and more of their income on housing also want out.<sup>61</sup>

The annual United Van Lines study that tracks migration patterns found that New York is also experiencing an exodus of people as 61 percent of all moves in 2017 were leaving New York, rather than moving into New York. This was the third highest outbound percentage of all states.<sup>62</sup> Further documenting the exodus from New York, a 2018 *New York Business Journal* article noted that “New York is top in the U.S. in terms of its residents leaving for other states....This trend has been the case for a while, as census data shows more New York citizens have been moving out of the state since around 2011. This exodus from New York is due to many factors, the top ones cited by experts being recent tax hikes, **high cost of living**, a poor jobs climate, and unideal weather.”<sup>63</sup>

“ Higher energy costs directly raise the relative costs of doing business in both states by increasing total business expenses, particularly for energy-intensive sectors.

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Businesses are not exempt from the exodus either. Like most factors driving up costs in both states, the policies encouraging the business exodus are multi-faceted; however, higher energy costs are a meaningful disincentive. Higher energy costs directly raise the relative costs of doing business in both states by increasing total business expenses, particularly for energy-intensive sectors. Higher energy costs also indirectly increase business expenses because the cost of living for employees is higher due to the higher energy costs. As a consequence, businesses in these states must pay higher wages and salaries in order to attract the necessary workers.

Businesses compete in a global market. Consequently, it will be difficult for these businesses to pass these higher costs on to consumers – if they do they will lose market share. Therefore, the only choices will be for these businesses to absorb these costs through lower profits or by not fully compensating employees’ wages for the higher cost of living. The result is businesses are less profitable, and employees are earning less, for no other reason than for locating in either California or New York. The documented business exodus is the expected result.

According to *Chief Executive* between 2008 and 2015 at least 1,687 California businesses moved to other states including

Toyota which has left Torrance and will complete the move of its U.S. headquarters to Dallas in the coming month. Also having left for Dallas is Jacobs Engineering Group, \$6.3 billion firm formerly based in Pasadena that has more than 230 offices across the world, employs 60,000 and generates \$12 billion in annual revenue.

Nissan North America (left for Nashville a decade before Carl's Jr. did), Jamba Juice (traded San Francisco for Frisco, Texas), Occidental Petroleum (prefers Houston over Westwood for its headquarters), Numira Biosciences (departed Irvine for Salt Lake City) and Omnitrac, a software firm (waved goodbye to San Diego and said hello to Dallas). Chevron moved 800 jobs from its Bay Area headquarters to Texas, and Waste Connections shifted more than 100 jobs to Texas from Folsom.

In addition, two dozen California companies have said they are tired of the business-bashing in Sacramento, along with the high taxes — and are now threatening to leave the state.<sup>64</sup>

Similarly, even though Wall Street remains a competitive advantage for New York, companies are still moving jobs to other states, in part, due to New York's high cost of living. For example, AllianceBernstein, a large money-management firm in New York City, is transferring over 1,000 jobs out of the state (to Nashville, TN), as has other major Wall Street firms including Goldman Sachs and Citigroup.<sup>65</sup> In fact, even by 2013 there was

growing evidence that [Wall Street] firms are starting to see they no longer need New York.

The city's share of jobs in the securities industry, which has gradually eroded for decades, dipped earlier this year to below 20 percent, an all-time low. Moreover, jobs lost after the financial crisis are being replaced in New York at less than half the rate of the rest of the country.<sup>66</sup>

The exodus of people and jobs out of California and New York, despite their historical advantages, illustrate the significant competitive disadvantages that the states' policies are creating. States that lack the advantages of California and New York can expect to bear even larger costs as well.

There are even more economic costs created by the CA-NY global climate change policies. Take the impact on fiscal policy as the example. Both states bear unnecessary fiscal costs due to their global warming policies. Specifically, the higher expenditures on favored global warming policies are, by definition, either crowding-out other government programs or imposing a higher burden on state taxpayers. The combination of rising spending and rising tax burdens indicates that the higher taxes that are necessary to fund these expenditures are creating additional fiscal drags on the states that further detract from their economic competitiveness.

As a last example of the economic costs from California’s and New York’s global warming policies, the CA-NY approach fosters the growing problem of economic cronyism. By design, California and New York are diverting ever more resources toward government sanctioned projects (favored energy sources) and away from government disfavored projects (fossil fuel energy sources). As Dan Mitchell from the Cato Institute has extensively documented, there is a strong link between the size of government and the amount of cronyism.<sup>67</sup> More problematically, “one’s first thought might be that cronyism is simply a forced redistribution from some to others and is, therefore, zero-sum. But this is false. Cronyism is negative-sum. That is, in the process of redistributing wealth, cronyism destroys wealth. Sometimes it destroys large amounts of wealth in the process of giving relatively small amounts of wealth to chosen parties.”<sup>68</sup>

“ By design, California and New York are diverting ever more resources toward government sanctioned projects (favored energy sources) and away from government disfavored projects (fossil fuel energy sources).

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The incidence of cronyism in California and New York, and the resulting inefficient resource allocations, have been growing for years, to the detriment of economic growth. Tesla exemplifies this problem.

Tesla has received billions of dollars either directly or indirectly from California. These resources were a transfer of money toward Tesla employees and stockholders and away from taxpayers, many of whom are low-income households or are economic competitors to Tesla. These transfers hampered the development of other potential projects in California. Making matters even worse, though perhaps not surprising, tumult at Tesla as of October 2018 raises questions regarding the company’s sustainability. Should Tesla go bankrupt, then the billions of dollars the company has received from California taxpayers, and all of the lost economic opportunities Californians surrendered, will have been for naught.

New York also paid Tesla (through SolarCity, which Tesla acquired) hundreds of millions of dollars to build a factory in Buffalo. The factory was supposed to produce solar roofing tiles, yet the project has still not produced a commercial product nor met any of the expected milestones for jobs and investment in the Buffalo community.

# Conclusion

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**G**overnment policies cannot increase prices, decrease quality, and promote economic growth. These are contradictory outcomes. Policies that increase costs on families and businesses will, by definition, discourage economic growth. Alternatively, promoting economic growth requires policies that neither distort prices nor promote politically favored products.

Yet, advocates for the CA-NY approach to global climate change are essentially claiming that energy is different, and that they can simultaneously promote these contradictory results. The purpose of this paper was to illustrate the fallacy of these claims.

The CA-NY approach to global climate change policies imposes large economic costs on both states. For families and households, the higher electricity and fuel costs increase their cost of living, and makes California and New York even less affordable places to live. The costs are particularly burdensome on lower-income families who can least afford these additional expenses. For businesses, the policies increase the costs of operating in these states and place additional strains on business profitability. The additional costs further encourage the economically damaging exodus of people and businesses away from both California and New York as well.

The burdens that Californians and New Yorkers must bear are even more troubling because the emission trends in other states demonstrate that the CA-NY approach is not necessary in order to meaningfully reduce overall GHG emissions. Total U.S. greenhouse gas emissions peaked in 2007 and have fallen over 14 percent since. In light of these trends, the CA-NY strategy should not be evaluated as if it is the only way to proceed. It must be evaluated against the strategies other states are implementing. Toward this end, embracing the fracking revolution and increasing the use of natural gas has been able to achieve what California and New York have not – these states have been able to lower GHG emissions while also promoting strong economic growth.

The inability of either California or New York to achieve these twin goals demonstrates that these states' energy policies are not a model for other states to follow; in fact, the emulation should work in reverse – California and New York should amend their energy and environmental policies to look more like the states that are enabling market-tested technologies to reduce GHG emissions while also promoting economic growth.

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## About the Author

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**Wayne H. Winegarden, Ph.D.** is a Senior Fellow in Business and Economics, Pacific Research Institute, as well as the Principal of Capitol Economic Advisors.

Dr. Winegarden has 20 years of business, economic, and policy experience with an expertise in applying quantitative and macroeconomic analyses to create greater insights on corporate strategy, public policy, and strategic planning. He advises clients on the economic, business, and investment implications from changes in broader macroeconomic trends and government policies. Clients have included Fortune 500 companies, financial organizations, small businesses, state legislative leaders, political candidates and trade associations.

Dr. Winegarden's columns have been published in the *USA Today*, *Wall Street Journal*, *Chicago Tribune*, *Investor's Business Daily*, *Forbes.com*, and *Townhall.com*. He was previously economics faculty at Marymount University, has testified before the U.S. Congress, has been interviewed and quoted in such media as CNN and Bloomberg Radio, and is asked to present his research findings at policy conferences and meetings. Previously, Dr. Winegarden worked as a business economist in Hong Kong and New York City; and a policy economist for policy and trade associations in Washington D.C. Dr. Winegarden received his Ph.D. in Economics from George Mason University.

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